

THE BRITISH JOURNAL
PHOTOGRAPHIC
ALMANAC
1903.



15

With the compliments of
Thomas Biddis
Esq

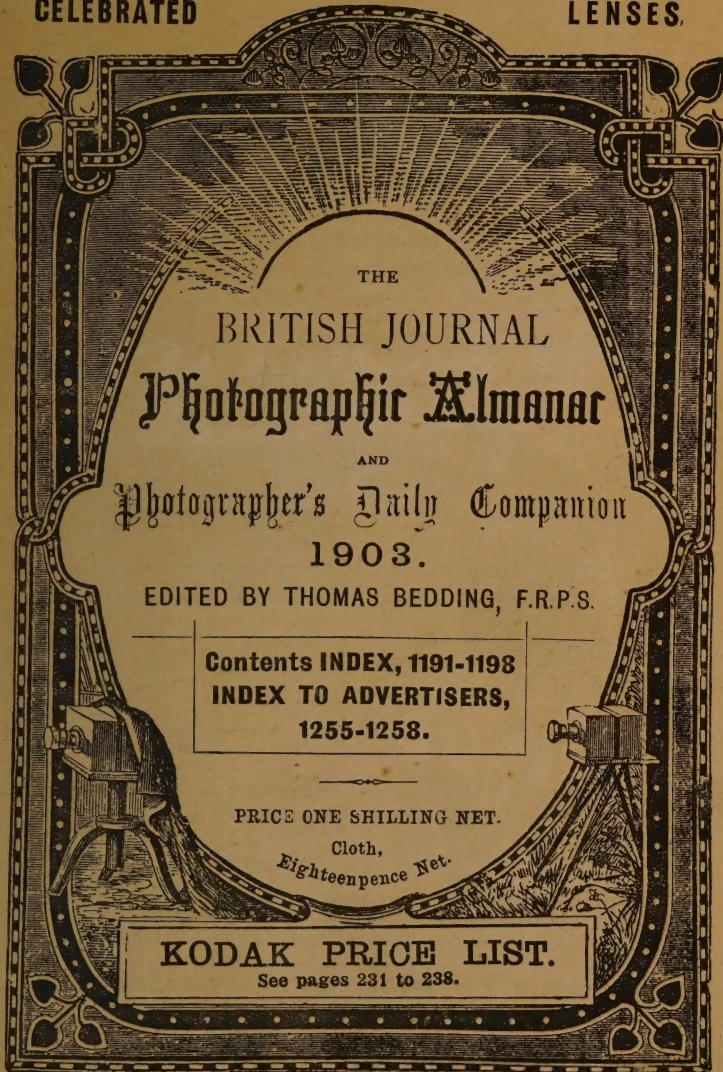
ROSS-ZEISS "PLANAR" & "UNAR" LENSES GIVE FINEST DEFINITION WITH EXTREME RAPIDITY.

CELEBRATED

ROSS'

LENSES.

ROSS' NEW SERIES PATENT HOMOCENTRIC LENSES ARE THE LATEST AND BEST.



ROSS, LTD, 111, NEW BOND STREET, W.

And 31, Cockspur Street, Charing Cross, S.W. [See pages 35-98.]

LONDON: HENRY GREENWOOD & CO., Publishers, 24, WELLINGTON STREET, STRAND.

PARIS: BOYVEAU & CHEVILLET, 22, Rue de la Banque. NEW YORK: G. GENNERT, 26, East 13th St. MELBOURNE: BAKER & ROUSE, LTD., J. W. SMALL & Co, WATSON & SONS.

SYDNEY: BAKER & ROUSE, LTD., J. W. SMALL & Co., AND HARRINGTON & Co., LTD. ADELAIDE & BRISBANE: BAKER & ROUSE, LTD. & HARRINGTON & Co., LTD. HOBART: P. ASH. CAPE COLONY, NATAL, RHODESIA, TRANSVAAL, AND ORANGE RIVER COLONY: LENNON, LTD.

VALPARAISO: BAILEY, DIENER & Co. BOMBAY: BABAJEE SAKHARAM & Co.

W. W. ROUCH & CO.

(Established 1854.)

**The Oldest Bona-fide Firm of Manufacturers
of Photographic Apparatus and Chemicals.**

MEDALS & AWARDS AT THE PRINCIPAL INTERNATIONAL EXHIBITIONS.

Rouch's Original "Model" Dark Tent.



THIS CELEBRATED DARK TENT is invaluable to the Amateur, both as a Travelling Dark-room for Developing or Changing Plates, and as a Permanent Laboratory at home when space is not otherwise available. It will be found replete with every convenience for working the different negative processes.

"A very perfect arrangement for the Photographer, whether in the field or en route."—*British Journal of Photography.*

"Rouch's Photographic Tent, taking all things into consideration, is the best Model that has yet been submitted to the public. It may be called a 'self-contained' dark-room; the packing box holds all the materials connected with it. The setting up and taking down of this Tent occupies exceedingly little time."—*Hardwich and Dawson's Manual.*

Prices Complete with Stand.

For working up to $7\frac{1}{2} \times 5$...	£6 6 0
For Plates $8\frac{1}{2} \times 6\frac{1}{2}$...	6 10 0
Do. 10×8 ...	7 0 0
Do. 12×10 ...	7 10 0
Do. 15×12 ...	8 10 0

OUTSIDE WATERPROOF COVERS, a great protection to the Tent when travelling. Small size, 18/-; larger sizes, 25/-.

All GENUINE Tents are stamped with our Name and Address on Ivory Plate.

APPARATUS FOR INDIA AND HOT CLIMATES.

LABORATORY, STUDIO, AND OUTDOOR APPLIANCES OF EVERY DESCRIPTION.

W. W. ROUCH & CO.,

Manufacturers of Photographic
Chemicals & Apparatus,

CONTRACTORS TO HIS MAJESTY'S GOVERNMENT,

161, STRAND, LONDON, W.C.

[See following page and pages 1576 and 1577.

ROUCH'S "EUREKA."

The Best Hand Camera.

The "EUREKA" IS NOT A TOY!

It has been improved considerably from time to time, and in its present form is undoubtedly the **MOST COMPACT, WORK-MANLIKE, AND SERVICEABLE** instrument on the market.

Testimony of an Independent Expert—

LOUIS MELDON, ESQ., of GREYSTONES, writes, Sept. 18, 1901:

"The Hand Camera of yours, which I have used for many years, has given me more satisfaction than any other."

The "Eureka" is used by Special Artists of Leading Illustrated Papers.

Mr. ROUCH'S unique sporting illustrations, which have appeared during the past six years in "Racing Illustrated," "Country Life," "The World of Sport," "Book of Cricket," &c., were all taken with a "Eureka" Camera.

The "Eureka" is made to carry twelve glass plates, although it can also be adapted for 24 cut films, or a Daylight Cartridge Roll-holder can be fitted.

Price complete, with Iris diaphragm to lens, Thornton-Pickard Adjustable Shutter, with Speed Indicator, pair of brilliant finders, and Automatic Register to changing back:—

Quarter-Plate, £6 12 6	5 × 4 ... £8 10 0
Half-Plate... ..	£12 12 0

Solid Leather Sling Cases with spring lock, 21/-, 25/-, 30/-. "Alpenstock" or Folding Stand for Time exposures, 21/-.

N.B.—At an extra charge of 10/- the plate reservoir can be made detachable, and extra backs containing a relay of plates can be supplied.

The Shutter fitted to the "Eureka" is timed up to $\frac{1}{80}$ th sec. For very rapid exposures the Focal Plane Shutter can be fitted in addition, giving exposures varying up to $\frac{1}{1000}$ th sec., at an extra charge of £2 10 0 for $\frac{1}{4}$ plate, £3 for 5 × 4, and £3 10 0 for $\frac{1}{2}$ plate,

W. W. ROUCH & CO., 161, Strand, London, W.C.

[See preceding page and pages 1570, 1577.]

MARION'S DRY PLATES.

Factory: Southgate, Middlesex.

All communications to 22 & 23, Soho Square, London, W.

ORDINARY.

(Yellow Label.)

No better plate can be had for all-round general work when light is good.

PORTRAIT AND LANDSCAPE.

(Blue Label.)

This plate is excellent for all gallery work, or for landscapes.

INSTANTANEOUS.

(Brown Label.)

For dark days, or dark galleries, or for snapshots, giving bright, clear negatives.

"P.S."

(Green Label.)

As the title denotes, these plates are prepared specially for Pyro-Soda developer. They are of EXTREME rapidity, giving BRIGHT, CLEAR negatives, and are not to be beaten by any other plate in the market.

MARION & CO., Ltd., 22 & 23, SOHO SQUARE, LONDON, W.

[See following pages.]

Marion's Dry Plates.



Factory: Southgate, Middlesex.

MADE IN FOUR RAPIDITIES

ORDINARY	...	...	...	...	average speed	40	H. & D.
PORTRAIT & LANDSCAPE	...	...	...	...	"	80	"
INSTANTANEOUS	...	...	...	...	"	120-200	"
"P. S."...	...	...	...	...	"	250	"

AT POPULAR PRICES.

MARION'S ACADEMY PLATES.

IN THREE RAPIDITIES AS ABOVE.

Extra rich in Silver, and are just the plates where great contrasts are to be photographed.

Being more thickly coated, these plates are almost

FREE FROM HALATION.

PRICES $\frac{1}{4}$ -pl. 1/6; $\frac{1}{2}$ -pl. 3/8 per dozen, &c.

BOOKLETS, with formulæ and full particulars for Working in English, French, and Spanish, free on application.

MARION & CO., Ltd., 22 & 23, SOHO SQUARE, LONDON, W.

[See preceding and following pages]

MARION'S PAPERS.

Factory: Southgate, Middlesex.

MARIONA P.O.P.

GLOSSY, WHITE, MAUVE, OR PINK.

15/- per quire.

MARIONA P.O.P.

MATT.

15/- per quire.

MARIONA P.O.P.

GROS GRAIN.

25/- per quire.

COLLODIO-CHLORIDE.

MATT.

25/- per quire.

QUICK-PRINT PAPER.

GLOSSY, MATT, AND CARBON.

This Paper can be printed by exposure to artificial light, either Magnesium Ribbon, Incandescent Gas, or Electric Light. May be opened and developed in weak gas light—a dark-room is not necessary.

BROMIDE PAPER.

MATT SURFACE, ALSO GLOSSY, IN WHITE, PINK, AND MAUVE.

Full particulars of Papers in Booklet, sent post free upon application.

In ENGLISH, FRENCH, and SPANISH.

MARION & CO., Ltd., 22 & 23, SOHO SQUARE, LONDON, W.

[See preceding and following pages.]

MARION'S PAPERS.

Factory: Southgate, Middlesex.

"RUSSET" P. O. P.

A paper lately introduced, and already in much favour.
Gives nice Brown Prints without any toning, and only require washing in water and fixing in a one per cent. solution of hypo.

In packets	$3\frac{1}{2} \times 2\frac{1}{2}$	24 pieces	...	...	6d.	In packets	$8\frac{1}{2} \times 6\frac{1}{2}$	12 pieces	...	1/-
"	$4\frac{1}{2} \times 3\frac{1}{2}$	"	...	...	6d.	"	10×8	8 "	...	1/-
"	5×4	"	...	...	1/-	"	12×10	5 "	...	1/-
"	$6 \times 4\frac{1}{2}$	"	...	...	1/-	"	15×12	3 "	...	1/-
"	$6\frac{1}{2} \times 4\frac{1}{2}$	"	...	...	1/-					

"RUSSET" POST CARDS.

Treated in same way as the paper. Per packet of 10, 6d.

Ferro-prussiate Paper in 1/- packets.

" **Post Cards** in 6d. packets.

For printing Blue Prints; these simply require washing in water after printing.

Marion's Carbon Show Mounts.

For exhibition purposes, or for showing photographs in windows, reception rooms, &c. These are solid card mounts with a surface mount laid on and deep bevel opening, the bevel being same colour as the mount. Wide margins. Extremely artistic and effective. They are made in three colours: deep olive green, iron grey and sepia brown.

PRICES:

Openings for cabinets	15/- doz.	Openings for 12×10	48/- doz.
" " $\frac{1}{1}$ plate	24/- "	" " oval panels	
		$11\frac{1}{2} \times 7\frac{1}{2}$	48/- "

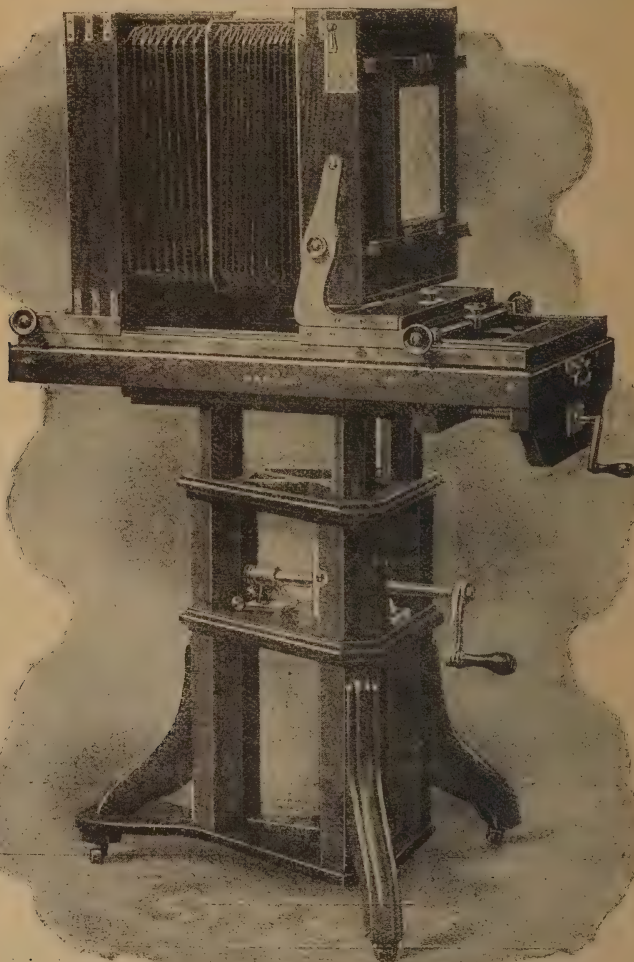
Special sizes cut to order.

MARION & CO., Ltd., 22 & 23, SOHO SQUARE, LONDON, W.

[See preceding and following pages.]

Marion's SOHO Combination Studio Camera.

"1903 Pattern."



For description see next page.

MARION'S

Soho Combination

Studio Camera.

1903 PATTERN.

WE can highly recommend this, the latest pattern Studio Camera. We have carefully studied every point where improvement was wanted in older patterns, and have effected some necessary changes, especially in the direction of strength and durability. The Camera is English made throughout in the very best style and finish, and will bear close inspection inside and out. Points requiring special strength, parts having the most wear and strain, have been gone into, and specially devised improvements introduced. Only the best material is used, the wood of camera being best Spanish mahogany, the stand being made in ebonised hardwood. Metal parts are in best quality lacquered brass. The extension racks, tilting screws, and stand gearing have all been re-designed, and, we think, are perfect both in accuracy and ease of motion. The bellows is of best leather, extending in the 12×10 size to four feet. The movements include rising and falling front, horizontal and vertical swing backs, double extension, sliding focussing screen. We have also fitted a simple arrangement to carry the focussing cloth, and also a lens screen. The prices include Camera and stand as described and illustrated, two lens fronts, a large dark slide with roller blind shutter, full size focussing screen, an extra back with focussing screen, and a repeating dark slide. Full sets of carriers from the largest size plate for which camera is intended down to quarter-plate, including two half-plates or two quarter-plates side by side, the whole forming a most complete studio outfit. It is THE camera for photographers abroad—will stand any climate.

Price, 12 inches square	£28 10 0
-------------------------	-----	-----	-----------------

" 15 " "	£31 10 0
----------	-----	-----	-----------------

Full particulars and Illustration sent on application.

MARION & CO., Ltd., 22 & 23, SOHO SQUARE, LONDON, W
[See preceding and following pages.]

MARION'S FIELD CAMERAS.

The IMPROVED OXFORD CAMERA, conical leather bellows, folding up very compactly, all movements, good quality.

Price, with 3 double backs :—

$\frac{1}{4}$ -pl.	$\frac{1}{2}$ -pl.	$\frac{1}{1}$ -pl.
74/-	100/-	142/-

The PROFESSIONAL FIELD CAMERA, a strong, serviceable outfit at a moderate price. In polished mahogany, cloth bellows, double extension and all movements.

Price, with 3 double backs :—

$\frac{1}{2}$ -pl.	$\frac{1}{1}$ -pl.	12 x 10
75/-	126/-	170/-

The PERFECTION CAMERA, a splendid instrument, well found in every respect. The larger sizes are specially suitable to the professional photographer. The price includes 3 double backs, turntable base, 3-fold ash sliding-leg tripod.

$\frac{1}{2}$ -pl.	$\frac{1}{1}$ -pl.	10 x 8	12 x 10	15 x 12
£8 5 0	£9 15 0	£12 5 0	£14 10 0	£18 5 0

The LONG FOCUS CAMERA, with square leather bellows, double extension, all movements, best quality and finish.

Price, with 3 double backs :—

$\frac{1}{2}$ -pl.	$\frac{1}{1}$ -pl.	10 x 8	12 x 10	15 x 12
£8 0 0	£10 0 0	£11 10 0	£13 2 0	£16 16 0

IN PREPARATION, a new Field Camera, very compact but very strong, with a specially designed front giving an extreme rise and swing movements in each direction. Best quality finish and material, with 3 double backs.

$\frac{1}{2}$ -pl.	$\frac{1}{1}$ -pl.
£7 0 0	£9 10 0

MARION & CO., Ltd., 22 & 23, SOHO SQUARE, LONDON, W.

[See preceding and following pages.]

MARION'S HAND CAMERAS

1903 SWALLOWS.

THESE Cameras are always in front, for neatness, reliability, accuracy of working, and low price.

THE MIGNON SWALLOW, 5/-

THE QUARTER PLATE SWALLOW, 15/-

THE SUPERIOR SWALLOW, 30/-

Has best Achromatic lens with magnifiers, covered view-finders, levels and screw-holes, and is newly fitted with a special Time and Instantaneous Shutter giving exposures from 2 seconds to $\frac{1}{100}$ second.

THE BEST SWALLOW, 50/-

Is with R. R. lens and with details as above.

Also made in 5 x 4 size at 21/-, 37/6, and 63/-

THE HALF PLATE SWALLOW,

Fitted with the new patent shutter as above, carries twelve plates, best Achromatic lens with magnifiers, finders, levels, &c. Price 75/-

ROLL FILM SWALLOW CAMERAS.

Several new lines in preparation. Ready early in the year.

THE IMPERIAL CAMERAS.

The best type of folding Hand Cameras. In great variety of fitting and finish. From 40/- to 160/-. Made in 5 x 4 and $\frac{1}{2}$ -plate sizes.

Liberal Terms to the Wholesale and Retail Trade.

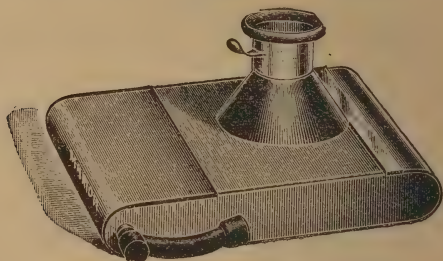
MARION & CO., Ltd., 22 & 23, SOHO SQUARE, LONDON, W.

THE QUINCEY PATENT PORTABLE DEVELOPING BOX.

Patented in England, U.S.A., Germany, &c.

SOLE AGENTS FOR GREAT BRITAIN & THE COLONIES:

MARION & CO., LTD.



THE DARK ROOM SUPERSEDED,

Development of Plates

Can take place at any time in an ordinary room, or out of doors, in daylight or by artificial light.

The method is simplicity itself, and results are as good and better than by development in a dark room.

~~~~~

For the Traveller, the Tourist, the Holidaymaker, **THE QUINCEY DEVELOPING BOX** is a necessity, while for every Amateur it is a great saver of time and trouble, and renders the pastime of Photography doubly easy.

*(See next page.)*

**MARION & CO., Ltd., 22 & 23, SOHO SQUARE, LONDON, W.**

## THE QUINCEY PATENT PORTABLE DEVELOPING BOX

(continued).

The Claims put forward for its use are as follows :—

- 1.—Either plates or papers may be developed in it equally well if not better than by use of the ordinary Dark Room.
- 2.—It can be used by gaslight, daylight, or the strongest sunlight, and yields indifferently a perfect result.
- 3.—No mechanical or chemical fog is produced under any circumstances in the development.
- 4.—Much greater facility in developing, as the arrangement of a temporary or permanent Dark Room is not required.
- 5.—Great saving in time in developing pictures, as the apparatus is always ready and in working order.
- 6.—The discomforts of a make-shift Dark Room, such as bath-room, cellar, &c., are not necessary.
- 7.—There is a great simplicity in operation, as the ordinary changing bag, arranged as a focussing cloth, is the only accessory to the apparatus itself necessary.
- 8.—The chemicals used for developing in the apparatus last longer, for being used in a confined space they oxidise less rapidly and, moreover, a very much smaller amount of the developer is necessary to produce a perfect result.
- 9.—Any kind of "Developer" can be used.
- 10.—There is no staining of the fingers in the operation of development, as the plate is thoroughly examined and operated without being touched.
- 11.—When fully equipped, the Camera, Lens, Dark Slide, and *Portable Dark Box*, Changing Bag, Chemicals, and Case will not have more bulk or weight than is usual at present, since by the use of the "Changing Bag" it is only necessary to carry *one* Dark Slide instead of three or more, as the bag may be used to transfer the plates from their boxes into the slides.

Directions for the use of the apparatus are sent out with each Box.

### PRICES.

$\frac{1}{4}$ -Plate, **10/6** each.  $5 \times 4$  Plate, **15/-** each.  $\frac{1}{2}$ -Plate, **21/-** each.

---

*Full Descriptive List sent on application.*

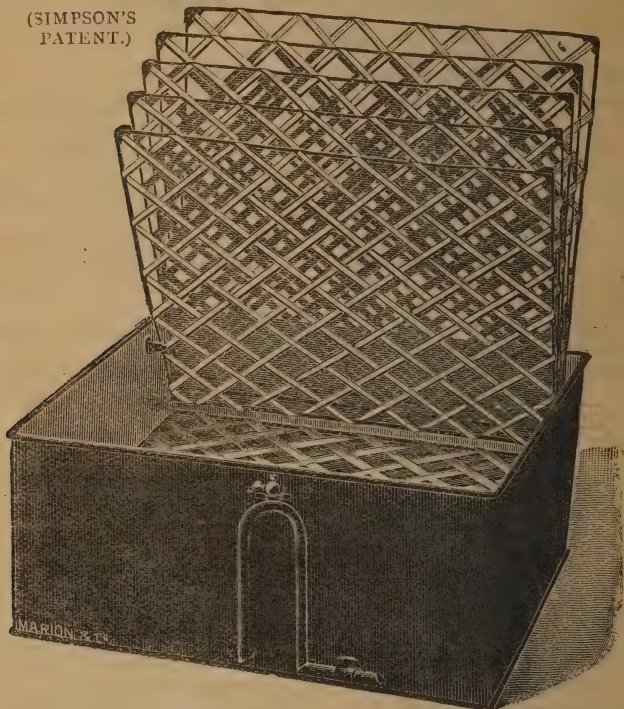
---

**MARION & CO., Ltd., 22 & 23, SOHO SQUARE, LONDON, W.**



# THE IMPROVED SECTIONAL PRINT WASHER.

(SIMPSON'S  
PATENT.)



**The most efficient Washer for P.O.P., Bromide Paper, Collodion Paper, and all soft-surfaced Prints.**

No damage to surface of Prints. No tearing of Prints. Thorough Washing.  
Hundreds are in daily use.

## PRICES:

|                     |                                                     |     |      |
|---------------------|-----------------------------------------------------|-----|------|
| No. 16 with 6 trays | 9×9 inches, holding 24 ½-plate or 12 ½-plate prints | ... | 7/6  |
| " 17 " 6 "          | 13×11 " " 48 " 24 "                                 | ... | 12/6 |
| " 18 " 12 "         | 9×9 " " 48 " 24 "                                   | ... | 15/0 |
| " 19 " 12 "         | 13×11 " " 96 " 48 "                                 | ... | 19/0 |
| " 20 " 12 "         | 25×19 " " from full-size sheets downwards           | ... | 45/0 |

## TWO NEW SIZES.

|                      |       |     |      |                       |       |     |      |
|----------------------|-------|-----|------|-----------------------|-------|-----|------|
| No. 17a with 6 trays | 16×13 | ... | 16/6 | No. 19a with 12 trays | 16×13 | ... | 27/6 |
|----------------------|-------|-----|------|-----------------------|-------|-----|------|

**MARION & CO., Ltd., 22 & 23, SOHO SQUARE, LONDON, W.**

*See preceding and following pages.*

# Marion's Enamelled Steel Dishes.

**Best Make.**

|               |         |                   |               |         |         |
|---------------|---------|-------------------|---------------|---------|---------|
| $\frac{1}{4}$ | 5 x 4   | $\frac{1}{2}$ pl. | $\frac{1}{4}$ | 10 x 8  | 12 x 10 |
| /9 ea.        | 1/-     | 1/3               | 1/8           | 2/2     | 2/8     |
| 15 x 12       | 18 x 12 | 18 x 14           | 20 x 16       | 24 x 19 |         |
| 4/-           | 6/6     | 7/-               | 7/6           | 15/-    |         |



**MARION'S**

## 'HANDY' PACKETS

For Developing, Fixing, Toning and Fixing.

In Boxes of 6 packets of one sort,

Per **1/-** Box.

**MARION'S**

## P.O.P. MOUNTANT

Guaranteed not to injure the most delicate prints. Always ready for use.

In Screw-capped Bottles,

**6d.** and **1/-** each.

## THE 'SOHO' CIRCLE PRINT TRIMMER.

**For Cutting Circle Prints.**

From  $\frac{1}{2}$  in. to 4 in. diameter.  
Zinc Plates with openings  $2\frac{1}{4}$  in.  
or  $3\frac{1}{4}$  in. dia. for trimming small pieces  
of paper with above, **6d.** each.

Zinc Plates, 8 in. square for  
Cutting upon, **5d.** each.



Price **12/-** each.

**MARION & CO, Ltd., 22 & 23, SOHO SQUARE, LONDON, W.**

[See preceding and following pages.]

## MARION & CO.'S SPECIAL ENLARGEMENTS FOR THE TRADE.

**BROMIDE PAPER ENLARGEMENT**, 15 × 12. Bust Vignette. Mounted on heavy plate paper mounts. Finished in COLOURED CRAYONS. A very effective picture, and colours will not fade.

Price, from original negative, 17/6.

Framed complete, close-up in green moulding, with flat, 23/-

**BROMIDE PAPER ENLARGEMENT**, 24 × 20. Bust Vignette. Mounted on heavy plate paper mounts. Finished in COLOURED CRAYONS. A very effective picture.

Price, from original negative, 31/6.

Framed complete, white and gold, or green and gold, 42/-.

**BROMIDE PAPER ENLARGEMENT**, 24 × 20. Bust Vignette. Finished in COLOURED CRAYONS.

Framed in wide green frame close-up. Price, from original negative, 42/-.

**CARBON ENLARGEMENT**, 24 × 18. Plain or Vignette. Mounted on heavy plate marked mount, 32 × 26. Finished in BLACK AND WHITE.

Price, from original negative, 31/6, or framed complete, close-up in imitation walnut with walnut spandril, 42/6.

**CARBON ENLARGEMENT**, 24 × 18. Plain or Vignette. Highly finished in BLACK AND WHITE.

Framed in handsome Chippendale walnut and gold frame. Price, from original negative, 105/-.

**CARBON ENLARGEMENT**, 24 × 18. Plain or Vignette. Highly finished in WATER COLOURS.

Framed in handsome Chippendale white and gold frame. Price, from original negative, 140/-.

**CARBON ENLARGEMENT**, on Opal, 36 × 28. Three-quarter or full length figure. With background, &c., introduced in WATER COLOURS. A well-finished picture.

Framed complete, in handsome imitation ormolu frame in rose-wood case. Price complete, £26.

### A MOST SUITABLE PICTURE FOR PRESENTATION.

For special sizes, quotations will be given on application.

### **PORTRAITS IN OIL.—Painted from Photographs.**

|                                         |     |         |                   |
|-----------------------------------------|-----|---------|-------------------|
| Direct on canvas, no Photographic Basis | ... | 24 × 20 | from 8 to 25 gns. |
| " " " "                                 | ... | 30 × 25 | " 10 to 30 "      |
| " " " "                                 | ... | 36 × 28 | " 15 to 40 "      |
| " " " "                                 | ... | 50 × 40 | " 25 to 50 "      |
| " " " "                                 | ... | 56 × 44 | " 30 to 60 "      |

Portraits painted from life in any size—prices on application.

### MINIATURES IN WATER COLOURS.

**PRINTS FROM NEGATIVES SUPPLIED**, on Opal. Vignette, 3 × 2½.

Oval. Finished in Water Colours and in Gilt Rim. Complete 10/-.

**Ditto on Opal.** Vignette, 4 × 3½. Oval. Finished in Water Colours and in Gilt Rim. Complete, 21/-.

**MINIATURES ON IVORY WITH OR WITHOUT PHOTO BASIS.**

Any size and prices to suit customers' requirements.

**MARION & CO., Ltd., 22 & 23, SOHO SQUARE, LONDON, W.**

*[See preceding and following pages.]*



# Mariotypes

Send Negatives  
to us,  
we do the work.

ARE Portraits in the form of Oval and Circular Medallions, which are as permanent as enamels, but superior in point of finish, as they retain all the Photographic Accuracy of Detail of the original negative. They are produced in Carbon in four tints, and hermetically closed from the atmosphere.

**VELVET SHOW BOARD**, containing one Mariotype each  $3\frac{1}{2}$  and  $4\frac{1}{2}$  in. circles and one each  $6\frac{1}{2}$  and 8 in. ovals showing four different tints of printing and the word "Mariotype" in Solid Silver Wire. Complete, 52/6



## PERMANENT PHOTO-MECHANICAL PRINTING.

From Negatives, Transparencies, and Prints,  
**FOR LOCAL VIEWS, VIEW BOOKS, BOOK  
ILLUSTRATIONS, &c.**

THIS Printing is equal in effect, and in many cases superior, to the ordinary Silver and Matt surface printing, and now the most used for the View Trade.

Its principal features are **Permanency and Cheapness**, which enables Dealers in Views to stock the most saleable subjects in quantities, at a small cost, and without any loss in fading, as in other prints.

They can be utilised in many different forms, such as Opalines, on Strut Backs, Plush Blocks, Boxes, &c., or mounted on Plate-marked Mounts for Framing, and can be coloured cheaply and effectively.

**Mounts in various Styles, Plush Blocks, Gilt Edge Glass, &c.,** may be had separately, or Prints mounted up complete, for which Special Quotations will be given.

**VIEW BOOKS** in this process cannot be equalled, and may be had in Silver or Platinum form, on smooth or rough paper.

**Pictorial Post Cards** of Local Scenery are much best in this process.

**SPECIMENS AND PRICES ON APPLICATION.**

**MARION & CO., Ltd., 22 & 23, SOHO SQUARE, LONDON, W.**  
[See preceding pages.]

# BROWN, SCOTT & CO.



We do not make the thin, soft, pulpy Mounts so generally advertised now, and confidently invite comparison of these with our quality and prices:

## ADVANTAGES WE OFFER.

**A Good Quality Mount at very Low Prices.**

*Always able to get them quickly instead of often having to wait while they are procured from abroad.*

Our stock is of the usual Cream on White, and Cream on Grey, but (providing 250 of one size are ordered) we will specially make them in any other colour or size Tint at same prices, within about two or three days after receipt of order.

## Second Quality Plate Mark Mounts.

With India Tint laid on, good solid English make.

| Size of Board. | Tint.         | Per 100. | Per 1000. |
|----------------|---------------|----------|-----------|
| 6½ × 5½ ...    | 4½ × 3½ ...   | 2/6 ...  | 25/0      |
| 10 × 8 ...     | 7 × 5 ...     | 4/6 ...  | 40/0      |
| 12 × 10 ...    | 9 × 7 ...     | 6/0 ...  | 57/0      |
| 14½ × 10½ ...  | 9½ × 7½ ...   | 9/0 ...  | 80/0      |
| 15 × 12 ...    | 10½ × 8½ ...  | 10/0 ... | 90/0      |
| 18 × 14½ ...   | 12 × 10 ...   | 15/0 ... | 140/0     |
| 18 × 14½ ...   | 12½ × 10½ ... | 15/0 ... | 140/0     |
| 20 × 15½ ...   | 13 × 11 ...   | 18/0 ... | 170/0     |
| 24 × 19 ...    | 16 × 13 ...   | 27/0 ... | 260/0     |

**Not less than 50 or 500 of one size at above prices.**

Any size or Colour Tint made providing 250 of one size are ordered.

Name and Address printed from 2/0 per 100 or free on 1000 of any one Size.

**Telegraphic Address: "PUNCTUAL, LONDON."**

[See following pages]

# CRÉPE PLATE MARK MOUNTS.

With India Tint laid on, the original perfect Crepe Surface,  
not the wretched imitations now so generally offered.

| Size of Board. |     | Tint.     |     | Per 100. |     | Per 1000. |
|----------------|-----|-----------|-----|----------|-----|-----------|
| 10 × 8         | ... | 7 × 5     | ... | 6/6      | ... | 60 0      |
| 12 × 10        | ... | 9 × 7     | ... | 8/6      | ... | 80 0      |
| 14½ × 10½      | ... | 9½ × 7½   | ... | 12/0     | ... | 108 0     |
| 15 × 12        | ... | 10½ × 8½  | ... | 13/6     | ... | 120 0     |
| 18 × 14½       | ... | 12 × 10   | ... | 21 0     | ... | 200 0     |
| 18 × 14½       | ... | 12½ × 10½ | ... | 21 0     | ... | 200 0     |
| 20 × 15½       | ... | 13 × 11   | ... | 25 0     | ... | 230 0     |
| 24 × 19        | ... | 16 × 13   | ... | 37 0     | ... | 350 0     |
| 29½ × 21½      | ... | 19½ × 16½ | ... | each 1 0 | ... | doz. 7/6  |
| 33 × 26        | ... | 19½ × 16½ | ... | „ 1/6    | ... | „ 15 0    |
| 33 × 26        | ... | 22 × 28   | ... | „ 1/6    | ... | „ 15 0    |
| 39 × 26        | ... | 25½ × 19  | ... | „ 1/9    | ... | „ 18 0    |
| 43 × 29        | ... | 32 × 24   | ... | „ 2 0    | ... | „ 20 0    |

*Stocked Cream on Grey only.*

**Not less than 50 or 500 of one size at above prices.**

Any colour or size Tint made providing 250 of one  
size are ordered.

Name and Address printed from 2/- per 100, or free on  
1000 of any one size.

## BROWN, SCOTT & CO.

Telegraphic Address:—"PUNCTUAL, LONDON."

*[See preceding and following pages.]*



## BEST QUALITY PLAIN SURFACE PLATE MARK MOUNTS.

With India Tint laid on, good solid English make.

| Size of Board.                       |     | Tint.                                |          | Per 100. |          | Per 1000. |
|--------------------------------------|-----|--------------------------------------|----------|----------|----------|-----------|
| $6\frac{1}{2} \times 4\frac{3}{4}$   | ... | 4 × 3                                | ...      | 3/3      | ...      | 30/0      |
| 7 × 5                                | ... | $4\frac{1}{2} \times 3\frac{1}{2}$   | ...      | 4/3      | ...      | 40/0      |
| 8 × 6                                | ... | 5 × 4                                | ...      | 4/6      | ...      | 42/0      |
| $8\frac{1}{2} \times 6\frac{1}{2}$   | ... | $6 \times 4\frac{1}{4}$              | ...      | 5/0      | ...      | 45/0      |
| 10 × 8                               | ... | 7 × 5                                | ...      | 6/6      | ...      | 60/0      |
| 12 × 10                              | ... | 9 × 7                                | ...      | 8/6      | ...      | 80/0      |
| $14\frac{1}{2} \times 10\frac{1}{2}$ | ... | $9\frac{1}{2} \times 7\frac{1}{2}$   | ...      | 12/0     | ...      | 108/0     |
| 15 × 12                              | ... | $10\frac{1}{2} \times 8\frac{1}{2}$  | ...      | 13/6     | ...      | 120/0     |
| 18 × $14\frac{1}{2}$                 | ... | 12 × 10                              | ...      | 21/0     | ...      | 200/0     |
| 18 × $14\frac{1}{2}$                 | ... | $12\frac{1}{2} \times 10\frac{1}{2}$ | ...      | 21/0     | ...      | 200/0     |
| 20 × $15\frac{1}{2}$                 | ... | 13 × 11                              | ...      | 25/0     | ...      | 230/0     |
| 24 × 19                              | ... | 16 × 13                              | ...      | 37/0     | ...      | 350/0     |
| $29\frac{1}{2} \times 21\frac{1}{2}$ | ... | $19\frac{1}{2} \times 16\frac{1}{2}$ | ... each | 1/0      | ... doz. | 7/6       |
| 33 × 26                              | ... | $19\frac{1}{2} \times 16\frac{1}{2}$ | ... „    | 1/6      | ... „    | 15/0      |
| 33 × 26                              | ... | 22 × 18                              | ... „    | 1/6      | ... „    | 15/0      |
| 39 × 26                              | ... | $25\frac{1}{2} \times 19$            | ... „    | 1/9      | ... „    | 18/0      |
| 43 × 29                              | ... | 32 × 24                              | ... „    | 2/0      | ... „    | 20/0      |

*Stocked Cream on White and Cream on Grey.*

**Not less than 50 or 500 of one size at above prices.**

Any size or Colour Tint made providing 250 of one  
size are ordered.

Name and Address Printed from 2/- per 100, or free on  
1000 of any one size.

# BROWN, SCOTT & CO.

Telegraphic Address : "PUNCTUAL, LONDON."

*[See preceding and following pages,*

## SECOND QUALITY OXFORD LINES.

Tinted both sides, good solid English Make. Cream, with Red Lines.

| Size of Board.           | Line | Per 100. | Per 1000. | Size of Board.          | Line | Per 100. | Per 1000. |
|--------------------------|------|----------|-----------|-------------------------|------|----------|-----------|
| 8½ × 6½...6 × 4½...      | 2/6  | ...      | 21/-      | 15 × 12 ... 10½ × 8½... | 7/-  | ...      | 65/-      |
| 10 × 8 ... 7 × 5 ...     | 2/9  | ...      | 26/-      | 18 × 14½ ... 12 × 10... | 11/6 | ...      | 108/-     |
| 12 × 10 ... 9 × 7 ...    | 4/3  | ...      | 39/-      | 20 × 15½ ... 13 × 11... | 14/- | ...      | 130/-     |
| 14½ × 10½ ... 10 × 8 ... | 6/-  | ...      | 54/-      | 24 × 19 ... 16 × 13...  | 20/- | ...      | 170/-     |

Not less than 50 or 500 of any one size at above prices.

Name and Address printed from 2/- per 100, or free on 1000 of any one size.

## CHEAPEST QUALITY CUT-OUT MOUNTS.

White or Tinted one side. Gilt Bound Bevels, but not Lined.

English Cut-out Mount Orders reasonably exceeding 20s. sent Carriage Paid; Irish, Scotch or Welsh, 60s.

| Description.     | Size, untrimmed. | Each. | Doz. | Gross. |
|------------------|------------------|-------|------|--------|
| Double Elephant  | ... 40 × 27 ...  | 1/6   | 15/- | 144/-  |
| Atlas            | ... 34 × 27 ...  | 1/-   | 9/-  | 90/-   |
| Imperial         | ... 32 × 22 ...  | 8/-   | 6/-  | 60/-   |
| Royal            | ... 25 × 20 ...  | 5/-   | 4/-  | 42/-   |
| Half Imperial    | ... 22 × 16 ...  | 4/-   | 3/-  | 27/-   |
| Half Royal       | ... 20 × 12½ ... | 3½/-  | 2/6  | 24/-   |
| Quarter Imperial | ... 16 × 11 ...  | 2½/-  | 1/10 | 20/-   |
| Quarter Royal    | ... 12½ × 10 ... | 2/-   | 1/6  | 15/-   |

For other sizes and qualities see Price List.

## BEST FLOCK, with BRONZE MATTS.

| Size.         | Dozen. | Gross. | Size.          | Dozen. | Gross. |
|---------------|--------|--------|----------------|--------|--------|
| 22 × 16 ..... | 7/-    | 72/-   | 10½ × 8½ ..... | 2/6    | 24/-   |
| 14 × 11 ..... | 3/6    | 36/-   | 9½ × 7½ .....  | 2/-    | 18/-   |

OAK, GOLD, and every other kind to order.

MOUNTING BOARDS, &c., and every Description of Frames.

## BROWN, SCOTT & CO.

RID LION YARD, 254 HIGH HOLBORN, LONDON, W.C.

P.O.O.'s Payable at High Holborn. Bankers—"National."

Established 1869.

Telegraphic Address, "PUNCTUAL, LONDON."

[See preceding pages,

# Cinematograph Specialists.

Actual Manufacturers of every requisite and appliance for Animated Photography.

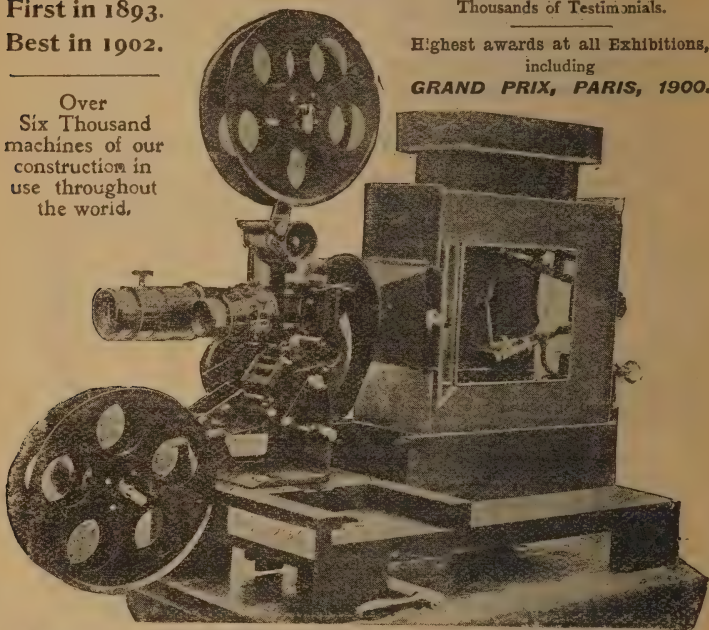
**First in 1893.**

**Best in 1902.**

Over  
Six Thousand  
machines of our  
construction in  
use throughout  
the world,

Thousands of Testimonials.

Highest awards at all Exhibitions,  
including  
**GRAND PRIX, PARIS, 1900.**



**The CHRONO."** King of Cinematographs.

From £13 to £36 (according to model).

The above is our medium-priced machine. **It is guaranteed for 2 years.**  
**Rock steady. Flickerless. Noiseless.**

**The CHRONO PROJECTOR. Series VD.**

Price, Machine and Lens only - £18 18 0

Outfit - £27 15 0

A still cheaper machine, the CHRONO PROJECTOR, Series VB, is also supplied.

Price, Machine and Lens only - £13 0 0

Outfit - £22 0 0

**L. GAUMONT & Co.,** 25 & 22, Cecil Court, Charing  
Cross Road, London, W.C.

[See following pages,



## Cinematograph Specialists. (See previous Page.)

### The Professional Chrono.

**King of Cinematographs.  
Triumph of Mechanics.  
Ideal of Exhibitors.**

—O—

Highest Award all Exhibitions.  
Guaranteed for Two Years.

—O—

Professional or Theatre Model  
**CHRONO. Series VII.**

Free from Flicker.

Rock Steady.

Comparatively Noiseless.

Combining every known advantage and improvement conducing to convenience and efficiency.

As used in the chief LONDON and PARISIAN THEATRES, and for HIGHEST CLASS EXHIBITIONS ALL THE WORLD OVER.

#### Chief Characteristics—

The movement of the picture gives minimum of motion with maximum of rest.

HOLLOW TRACK FOR FILM.  
AUTOMATIC LIGHT CUT OFF.  
MASKING DEVICE.—Moves with Lens, and has 1/4 inch travel.

AUTOMATIC TAKE-UP LANTERN ATTACHMENT.

PATENT SHUTTER.

Can be run by Motor.  
Spools for 2,000 feet of Film.

#### Price—

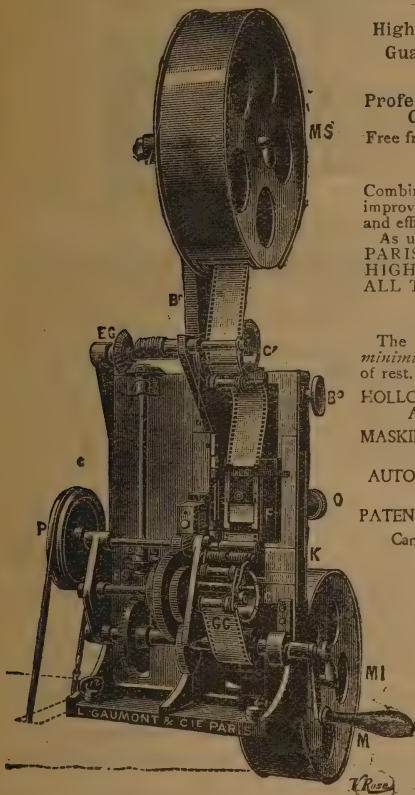
**Machine and**

**Lens only £36 0 0**

**Outfit = 44 15 0**

**Every requisite & appliance always in stock.**

Illustrated and fully descriptive Catalogue on demand.



**L. GAUMONT & CO.,**

Laboratory and Dark Rooms—  
22, Cecil Court.

Offices and Show Rooms—

25, Cecil Court, Charing  
Cross Road, London, W.C.  
(Near the Alhambra.)

Studio and Open-air Theatre—Loughboro', S.E.

[See preceding and following pages.]

# A BOON TO LANTERNISTS

And all users of Limelight.



*Regd. Trade Mark.*

A RELIABLE SUBSTITUTE FOR GAS CYLINDERS.

The **Oxygenator** is a **new invention** for obtaining **Pure Oxygen under high pressure** by the mere application of water to **Oxylith** (a new product). The gas is generated much in the same way as Acetylene is obtained from Carbide. For **High Power illuminating** or medical and pharmaceutical purposes it stands unique.

Unlike the messy and unsatisfactory Generators of the old type, there is absolutely no danger in any part of the very simple operations. No light or heat is required, nothing in fact except water and Oxylith. The generation is always under control and the pressure amply sufficient for a high power jet. Full particulars on application.

Price for illuminating (powerful model)    **£8 8s.**

„ „ Surgical work ... .. **£6 6s.**

The **Oxygenator** is the first and only oxygen generator sufficiently powerful and reliable to make the lanternist really **independent of Cylinders.**

Obtainable only from—

**L. GAUMONT & CO.**

*[See preceding and following pages.]*

## ANIMATED PHOTOGRAPHY IN ALL BRANCHES TAKING. PRINTING. PROJECTION.

ALL APPLIANCES ALWAYS IN STOCK.

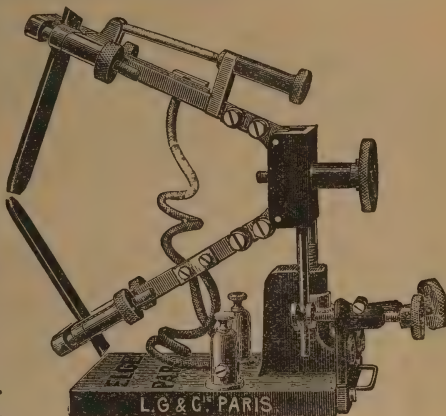
The "ELCÉ" Arc  
Lamp. For High or  
Low Voltages, takes  
up to 60 ampères.

£6 6s.

The "ELCÉ" Re-  
sistances. For 100  
to 250 volts, giving  
20 to 60 ampères.

£7 10s.

Aluminium Frame . . .  
Slate Mounts, &c., &c.



**HIGH POWER JETS AND SATURATORS.**

## ENGLISH FILM SUBJECTS.

The Pioneers of Pantomime and Play Subjects.  
NOW READY, COMPLETE PLAYS.

**EAST LYNNE** (500 feet) Price **£17 10s.**

**MARIA MARTIN** (400 feet) Price **£13 10s.**

With scores of New and Original Comic and Interesting Subjects.

**Comic Films. Full Catalogue New Subjects now ready.**

Full particulars on application to—

**L. GAUMONT & Co.,**

Cinematograph Specialists,

OFFICES AND SHOWROOMS—

**25, Cecil Court, Charing Cross Road, London, W.C.**  
(Opposite Alhambra.)

LABORATORY AND DARK ROOMS: | STUDIO AND OPEN AIR THEATRE:  
**22, Cecil Court.** | **Loughboro' Junction, S.E.**

Telegrams: "OBJECISTI, LONDON." Telephone: 2430 Gerrard.

[See preceding pages.

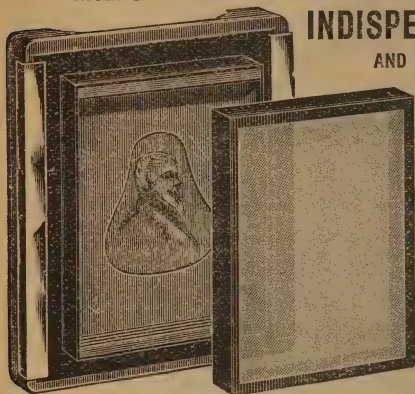


# SALMON'S VIGNETTER,

169 HAMPSTEAD RD., LONDON, AND OF ALL DEALERS.  
MILES AHEAD of all other Vignettters for efficiency.

## INDISPENSABLE FOR BROMIDES

### AND ALL CONTACT PRINTING.



Complete for attaching to any Printing frame, with 12 Vignetting Cards and Light Diffuser.

|                    |              |                    |                    |
|--------------------|--------------|--------------------|--------------------|
| $\frac{1}{2}$ -pl. | $5 \times 4$ | $\frac{1}{2}$ -pl. | $\frac{1}{2}$ -pl. |
| 2/-                | 2/3          | 2/6                | 3/6                |

With superior printing frame attached inclusive:—

|                    |                    |                    |                    |
|--------------------|--------------------|--------------------|--------------------|
| $\frac{1}{2}$ -pl. | $5 \times 4$       | $\frac{1}{2}$ -pl. | $\frac{1}{2}$ -pl. |
| 2/6                | 2/10 $\frac{1}{2}$ | 3/3                | 4/9                |

**SALMON'S PATENT VIGNETTER** may be used with any ordinary printing frame, and in no way interferes with its use when Vignettes are not required. Immediately attached or detached.

Remains secure in any position, clipped by Aluminium Slides, allowing of adjustment up and down or sideways, and by means of metallic grooves the Vignetting cards (not serrated) can be placed nearer or farther from Negative and at an angle, or immediately changed for another card of different size opening, producing a vignetted print of the greatest excellence. Will vignette any part of negative, viz.: Carte-de-Visite bust from  $\frac{3}{4}$ -length Cabinet. Unpicturesque surroundings of Groups, &c., may be vignetted out.

### GENERAL DIRECTIONS.

**FOR BROMIDE PRINTING.**—Place a piece of tissue paper over opening in card, and with light diffuser on, give a circular or twist motion to printing frame during exposure.

**THIN NEGATIVES.**—Much more vigorous prints, either Silver or Bromide, may be obtained from thin negatives by Use of Light Diffuser, without Vignetting card (when Vignettes are not required).

**THE LIGHT DIFFUSER** prevents dust, &c., settling on negatives during printing, thereby preventing white spots on finished prints.

**DENSE NEGATIVES.**—The Light Diffuser can be dispensed with.

*TESTIMONIALS from Leading Eminent Authorities.*

**DEALERS** (please note).—Showcard Vignetted Photographs (great window attraction) post free on application.

**SALMON'S MULTUM DISH ROCKER, 10s. 6d.**

**SALMON'S PORTABLE LIGHTING APPARATUS.**

**£10 10s.**

PARTICULARS  
ON APPLICATION.

**FUERST BROTHERS,  
17, Philpot Lane,  
London, E.C.**

# Are **HEADQUARTERS**



**For all Photographic Chemicals.**



**Also the Sole Agents for . . .  
HAUFF'S Modern Developers,  
Adurol, Amidol, Metol, Ortol,  
Pyraxe, &c., &c.**



**FLASHAXE, Smokeless Flashlight Candles, from 6d. each.  
COLDAXE, Backing Solution. . . . .  
SENSAXE, Sensitizer for Postcards, Silk, &c. . . . .**



**Proprietors of the  
"Axe" Brand Specialties.**

**Full PRICE LIST . .  
.. on application.**

The Knowledge Gained soon Repays the Moderate Fee.

# LESSONS IN NEGATIVE RETOUCHING.

**T. S. BRUCE,**  
High-class Trade Retoucher  
(Established 1886),  
thoroughly instructs in this necessary branch of Photography.

**The lessons can be given by day, night, or by POST.**  
A speciality is made of **POSTAL LESSONS** (all English-speaking countries), and in **improving and quickening the work of slow and defective retouchers.**

**CONCERNING THE POSTAL LESSONS.**—The Editor of "THE BRITISH JOURNAL OF PHOTOGRAPHY," the leading Trade Paper, in the issue for March 1st, 1901, under heading "Retouching Lessons by Post," in the "Commercial and Legal Intelligence" column, page 138, remarks: "Mr. Bruce encloses us four original testimonials which speak very highly of his success as a teacher of Retouching by Post. We have much pleasure in making known his abilities in this important branch of Photographic Tuition."

"THE BRITISH JOURNAL OF PHOTOGRAPHY," March 15th, 1901, in "Correspondents' Column," page 176, "Retoucher" writes: "... I enclose a few prints done by me during the six lessons. Perhaps you, Mr. Editor, will comment on them, and give your opinion as to the efficacy of Postal Lessons." The Editor replied in a footnote to this question: "We congratulate both tutor and pupil. The specimens of work sent are very good indeed, and do the greatest credit to Mr. Bruce's method of Teaching by Post."

## As to the **PERSONAL LESSONS:**

"37, Fordwych Road, West Hampstead, London, N.W.

"To Mr. T. S. Bruce.

"Dear Sir,—You will be pleased to hear that I am a retoucher at Messrs. W. & D. Downey's, the Court Photographers, of Ebury Street, S.W.

"I am exceedingly obliged for your skill and attention in teaching me so effectually as to secure such a place. You can use this letter as a recommendation if you so desire.

"Yours truly, (Miss) E. NOWELL."

The above testimonial is inserted with written permission from  
Messrs. W. & D. Downey.

Many of my pupils have become trade retouchers, whilst others have secured good situations with first-class firms. All pupils have greatly advanced.

Write for Fees, Price Lists of Retouching, and for lists of my noted **RETOUCHING MATERIALS**, including the well-known Non-shifting Retouching Medium, Matt-surface Powder for B. & W. and Bromide Print Finishers, Retouching Desks, Lamps, Knives, Globes, &c.

**Address T. S. BRUCE**  
(Established 1886),

**4 Villas-on-Heath, The Vale, Hampstead, London, N.W.**

THE  
**Tella Camera Company,**  
 OF  
**110, SHAFTESBURY AVENUE,**  
**LONDON, W.,**  
 ARE THE  
**Cheapest Photographic Material Dealers**  
**IN LONDON.**

*Old Cameras Exchanged for New Ones.*

LISTS FREE. EXTENDED PAYMENTS IF DESIRED.

We hold the Largest Stock of Up-to-date Second-hand Apparatus,  
 and offer it from 25 to 50 per cent. under list.

WEEKLY AUCTION SALES OF  
**CAMERAS, LENSES, ENLARGERS,**  
**CINEMATOGRAPHS,**  
**LANTERNS,**

and all kinds of

**Photographic, Optical and Scientific Apparatus,**  
**Phonographs, Records, Sundries, etc.,**

by

**MR. W. E. DUNMORE,**

In the Large Ground Floor Room of his Mart,

**33, GERRARD STREET, SHAFTESBURY AVENUE,**

(Next door to the National Telephone Exchange)

**LONDON, W.**

Telegrams: "TILLURATO, LONDON." Customers' Goods Sold Free.

**Particulars and Catalogues Post Free.**



# LUMIÈRE

## PLATES

Ordinary and Orthochromatic.

For All Climates.

## PAPERS

Citrate P.O.P. & Bromide. Standards of Excellence.

## CHEMICALS

Developers, Intensifiers, Reducers, &c. Purest known.

---

THE LATEST ADVANCE IS THE

**L.N.A.** Process of Colour Photography

Can be worked by anyone, using present Camera and Lens.

**ECONOMICAL. SIMPLE. SATISFACTORY.**

CABINET, containing all necessary materials,

**25/-**

---

Full Price Lists from

**LUMIÈRE N. A. CO., Ltd.,**

4, Bloomsbury Street, New Oxford Street,

**LONDON, W.C.**

Sole Proprietors for Great Britain, India, the Colonies, and North America, of the Celebrated Lumière Products.

# LUMIÈRE

## FILMS

(HITHERTO KNOWN AS PLANCHON FILMS)

***For all makes of Roll Film Cameras,  
Roll Holders, &c.***

The introduction of this Film under the name of the

## PLANCHON FILM

created an unprecedented demand, making extension of factories imperative. This is now complete, and increased facilities, improved plant and greater rapidity of emulsion combine to form the most perfect Film that can be produced. No trouble from setting off of numbers, keeping qualities of the highest degree, and

***NO RESTRICTIONS.***

Full Price Lists from

**LUMIÈRE N. A. CO., Ltd.,**

4, Bloomsbury Street, New Oxford Street,

**LONDON, W.C.**

Sole Proprietors for Great Britain, India, the Colonies, and North America of the  
Celebrated Lumière Products.

## FOR BEST RESULTS USE ONLY

# "Rotograph" Bromide Papers

**MATT and GLOSSY, in Seven Grades. Sample packet of Three Grades, A, C, E, 6d. post free.**

A—Thin glossy.  
B—Thick glossy.

C—Thin matt smooth.  
D—Thick matt smooth.  
G—Thick rough white.

E—Thin matt rough.  
F—Cream tinted, thick rough.

## "ROTOGRAPH" NEGATIVE PAPER

|                                                                | <i>s. d.</i> |
|----------------------------------------------------------------|--------------|
| $4\frac{1}{2} \times 3\frac{1}{4}$ ( $\frac{1}{4}$ -plate) ... | 0 9          |
| $5 \times 4$ " ...                                             | 1 0          |
| $5\frac{1}{2} \times 4$ " ...                                  | 1 2          |
| $6 \times 4\frac{1}{4}$ (cabinet) ...                          | 1 5          |
| $6\frac{1}{2} \times 4\frac{1}{4}$ ( $\frac{1}{4}$ -plate) ... | 1 6          |
| $7\frac{1}{2} \times 5$ " ...                                  | 2 3          |

### PRICES. CUT SHEETS.

(In packets of 12 sheets).

|                                                                | <i>s. d.</i> |
|----------------------------------------------------------------|--------------|
| $8\frac{1}{2} \times 6\frac{1}{2}$ ( $\frac{1}{4}$ -plate) ... | 3 0          |
| $10 \times 8$ " ...                                            | 4 0          |
| $12 \times 10$ " ...                                           | 6 6          |
| $12\frac{1}{2} \times 10\frac{1}{2}$ " ...                     | 7 0          |
| $15 \times 12$ " ...                                           | 9 6          |

**TWO SPEEDS—NORMAL and RAPID.** Specially adapted for large work. Sample packets of 6 pieces,  $\frac{1}{4}$ -plate, on receipt of **1s.** in stamps. Circular and instructions free on application.

OUR NEW

GASLIGHT

PAPER

# "Rotokon"

Sample Packet of 3 Grades, 1, 3, and 5,  
**6d. post free.**

**IN SIX GRADES. No Dark Room Required.**

No. 1—Thin glossy rose.  
" 2—Thin glossy mauve.  
" 3—Thin matt smooth.  
" 4—Thick matt smooth.  
" 5—Thick tinted rough.  
" 6—Thick rough white.

**SAME PRICES AS  
BROMIDE PAPER.**

## "Rotograph" Developer.

|                                   |     |
|-----------------------------------|-----|
| Per $\frac{1}{2}$ lb. tin box ... | -/7 |
| " $\frac{1}{4}$ lb. " ...         | 1/1 |
| " 1 lb. " ...                     | 2/- |

Postage extra.

## "Rotograph" AND "Rotokon"

### SENSITISED POST-CARDS.

Matt or glossy, 1/- per packet of 12.

# "The Bromide Monthly"

**EVERY WORKER SHOULD GET IT. WITH SPLENDID BROMIDE FRONTISPIECE.**

Specimen Copy Free on receipt of **3d.** in Stamps, Annual (post free) Subscription, **2/6**

To be obtained of all Dealers, or from

**THE ROTARY PHOTOGRAPHIC CO., Ltd.**  
**14, NEW UNION ST. (Moorfields), LONDON, E.C.,**  
**WORKS: WEST DRAYTON, MIDDLESEX.**





TAKEN WITH

# ROSS' NEW FOCAL-PLANE CAMERA.



AUTUMN.

Copyright.

FITTED WITH

## ROSS' PATENT "HOMOCENTRIC" LENS.

---

## ABRIDGED CATALOGUE for 1903, Cancelling all Previous Lists.

---

### MEDALS AND HIGHEST AWARDS.

London, 1851. Paris, 1867. London, 1862. Philadelphia, 1876. Paris, 1878

Antwerp, 1878. Inventions Exhibition, 1885. Sydney, 1879.

Grand Prix and Gold Medal Paris, Exposition Universelle, 1889.

Kingston, Jamaica, 1891. Chicago, 1893.

Grand Prix, Diploma of Honour, and Gold, Silver, and Bronze Medals  
Brussels, 1897.

**GRAND PRIX and GOLD MEDAL, PARIS, 1900.**

---



ROSS' NEW OPTICAL WORKS, CLAPHAM COMMON.

---

# ROSS, LTD.,

## MANUFACTURING OPTICIANS,

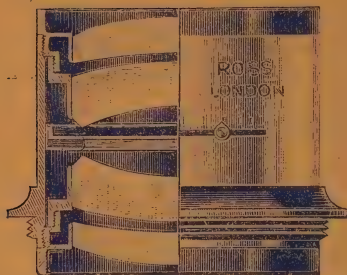
Contractors to His Majesty's Governments, British and Colonial,  
also to the Principal Foreign Governments.

ESTABLISHED 1830.

## A NEW LENS.

# Ross' "Homocentric"

PATENT.



"HOMOCENTRIC" signifies the ideal definition obtained when all rays of light emanating from any one point of the object are converged by a lens again into one point in the image.

The New "HOMOCENTRIC" Lens possesses this definition to a degree hitherto unattained, and hence the name given to the Lens.

In the construction of photographic lens systems generally, a certain residue of secondary spherical aberration cannot be eliminated when a flat field is obtained. This aberration, known as "spherical zones," tends to destroy the fine detail, more especially in the centre of the image, and causes the focus of the lens to vary with the aperture of stop used, imperfections which are particularly injurious to the quality of the image when enlarged and in lenses of long focus.

"HOMOCENTRIC" Lenses are absolutely free from these spherical zones, and have not the slightest variation in focus whether large or small diaphragms are used; consequently they possess the most exquisite defining power. Enlargements, therefore, from a negative taken with a "HOMOCENTRIC" Lens are perfect in detail and fineness of contrast.

"HOMOCENTRIC" Lenses, while being equal to any other anastigmat in flatness of field, freedom from coma and astigmatism, have their colour correction so perfect that the different coloured images are identical in size and position, thus rendering the "HOMOCENTRIC" Lens, which is semi-apochromatic, specially suitable for three-colour and other process work.

*See following pages.*

## A NEW LENS.

# Ross' "Homocentric"

PATENT.

THE "HOMOCENTRIC" is symmetrical; of four single meniscus lenses, with sufficient space for between-lens shutters.

THE "HOMOCENTRIC" is made in Series of different relative apertures to suit various purposes, as follows:—

SERIES B, aperture  $f/5.6$ , for Hand Camera Work, extremely rapid exposures in the Studio or out of doors, such as Portraits, Groups, Instantaneous Pictures and for Cinematograph and Lantern Projection.

SERIES C, aperture  $f/6.3$ , specially recommended for Hand Cameras, Instantaneous Views and Groups, and all work requiring quick exposure. Though not so rapid as Series B, a large angle of view is embraced when required.

SERIES D, aperture  $f/8$ , for ordinary Hand Camera work, Landscapes, Groups, Interiors, and Copying. With a medium size stop, lenses of this Series may be used for wide angles and uniform covering obtained.

SERIES Da,  $f/8$ , supplied in rigid setting with Waterhouse Diaphragms, specially for Line, Half-Tone, Three Colour, and all Process work.

The single combinations of any of the various series of "HOMOCENTRICS" may be employed as long focus landscape lenses. Used with a moderate size stop they give excellent results on the same sizes of plates as the complete combination.

"HOMOCENTRICS" are supplied to order in special settings, focussing from three yards to infinity by adjustment of the front lens.

"HOMOCENTRICS" are accurately paired for Stereoscopic work at an extra cost of 8s.

*For Prices, &c., see following pages.*



**ROSS'**NEW  
PATENT**Homocentric Lenses.****SERIES B. *f* 5·6**

FOR

**Portraits, Groups, Instantaneous Pictures,  
and Hand Camera Work.**RATIO OF STOPS ... *f*/5·6 *f*/8 *f*/11·3 *f*/16 *f*/22·6 *f*/32 *f*/45

| No. | Equiv.<br>Focus.  | PLATE COVERED.                    |                                   | PRICE.              |       |                          |       |
|-----|-------------------|-----------------------------------|-----------------------------------|---------------------|-------|--------------------------|-------|
|     |                   | Full<br>Aperture.                 | Smaller<br>Stops.                 | In Iris<br>Setting. |       | In Focussing<br>Setting. |       |
|     |                   |                                   |                                   | £                   | s. d. | £                        | s. d. |
| B 1 | 5 inch            | 4 $\frac{1}{4}$ × 3 $\frac{1}{4}$ | 4 $\frac{3}{4}$ × 3 $\frac{1}{2}$ | 5                   | 0 0   | 5                        | 15 0  |
| 2   | 5 $\frac{1}{2}$ " | 4 $\frac{3}{4}$ × 3 $\frac{1}{2}$ | 5 × 4                             | 5                   | 10 0  | 6                        | 5 0   |
| 3   | 6 "               | 5 × 4                             | 6 $\frac{1}{4}$ × 4 $\frac{3}{4}$ | 6                   | 0 0   | 7                        | 0 0   |
| 4   | 7 "               | 6 $\frac{1}{2}$ × 4 $\frac{3}{4}$ | 7 $\frac{1}{2}$ × 5               | 7                   | 0 0   | 8                        | 0 0   |
| 5   | 8 $\frac{1}{2}$ " | 7 $\frac{1}{2}$ × 5               | 8 $\frac{1}{2}$ × 6 $\frac{1}{2}$ | 8                   | 10 0  |                          |       |
| 6   | 10 "              | 8 $\frac{1}{2}$ × 6 $\frac{1}{2}$ | 10 × 8                            | 12                  | 0 0   |                          |       |
| 7   | 12 "              | 10 × 8                            | 12 × 10                           | 17                  | 0 0   |                          |       |
| 8   | 15 "              | 12 × 10                           | 15 × 12                           | 23                  | 0 0   |                          |       |
| 9   | 18 "              | 13 × 11                           | 18 × 16                           | 30                  | 0 0   |                          |       |
| 10  | 21 "              | 15 × 12                           | 22 × 18                           | 38                  | 0 0   |                          |       |
| 11  | 24 "              | 18 × 16                           | 25 × 22                           | 47                  | 10 0  |                          |       |

**Cost of Pairing two Lenses for Stereoscopic Work, 8/-**

The Lenses of this Series are specially recommended for all kinds of extremely rapid work for Portraits and Groups, also for Cinematograph work and Lantern Projection. The Single Combinations may be used with suitable stops as long focus lenses.

**THE ABOVE PRICES ARE NET.****Sold by all Leading Photographic Dealers,**

**ROSS'**NEW  
PATENT**Homocentric Lenses.****SERIES C. f6·3.**

FOR

**Instantaneous Views and Groups and Hand  
Camera Work.**

RATIO OF STOPS ... f/6·3 f/8 f/11·3 f/16 f/22·6 f/32 f/45

| No. | Equiv.<br>Focus. | PLATE COVERED.    |                   | PRICE.              |                          |
|-----|------------------|-------------------|-------------------|---------------------|--------------------------|
|     |                  | Full<br>Aperture. | Smaller<br>Stops. | In Iris<br>Setting. | In Focussing<br>Setting. |
| C 1 | 5 inch           | ... 4½ × 3½       | ... 5 × 4         | £ 4 0 0             | £ 4 15 0                 |
| 2   | 5½ "             | ... 4½ × 3½       | ... 6 × 5         | 4 5 0               | 5 0 0                    |
| 3   | 6 "              | ... 5 × 4         | ... 6½ × 4½       | 4 10 0              | 5 5 0                    |
| 4   | 7 "              | ... 6½ × 4½       | ... 7½ × 5        | 5 10 0              | 6 5 0                    |
| 5   | 8½ "             | ... 7½ × 5        | ... 8½ × 6½       | 7 0 0               | 8 0 0                    |

**VERE: Cost of Pairing Two Lenses for Stereoscopic Work, 8s.**

The Lenses of this Series are admirably adapted for Hand Cameras. Their Single combinations may be used for work requiring lenses of long focus, giving excellent results when used with a small stop on the same sizes of plates as the Doublets.

THE ABOVE PRICES ARE NET.

SOLD BY ALL LEADING PHOTOGRAPHIC DEALERS.

**ROSS'**NEW  
PATENT**Homocentric Lenses.****SERIES D. f8.**

FOR

**Views, Groups, Interiors, Copying, and  
Hand Camera Work.**

RATIO OF STOPS ... .. f/8 f/11.3 f/16 f/22.6 f/32 f/45.2

| No.     | Equiv.<br>Focus. | PLATE COVERED.                         |                                        |                                        | PRICES.             |                            |
|---------|------------------|----------------------------------------|----------------------------------------|----------------------------------------|---------------------|----------------------------|
|         |                  | Large<br>Stop.                         | Medium<br>Stop.                        | Small<br>Stop.                         | In Iris<br>Setting. | In Focuss-<br>ing Setting. |
| D 1 ... | 5 in.            | $4\frac{1}{2} \times 3\frac{1}{2}$ ... | $5 \times 4$ ...                       | $6\frac{1}{2} \times 4\frac{3}{4}$     | £3 10 0             | £4 5 0                     |
| 2 ...   | $5\frac{1}{2}$ „ | $4\frac{3}{4} \times 3\frac{3}{4}$ ... | $6 \times 5$ ...                       | $7 \times 5$                           | 3 15 0              | 4 10 0                     |
| 3 ...   | 6 „              | $5 \times 4$ ...                       | $6\frac{1}{2} \times 4\frac{3}{4}$ ... | $7\frac{1}{2} \times 5$ ...            | 4 0 0               | 4 15 0                     |
| 4 ...   | 7 „              | $6\frac{1}{2} \times 4\frac{3}{4}$ ... | $7\frac{1}{2} \times 5$ ...            | $8\frac{1}{2} \times 6\frac{1}{2}$ ... | 5 0 0               | 5 15 0                     |
| 5 ...   | $8\frac{1}{2}$ „ | $7\frac{1}{2} \times 5$ ...            | $8\frac{1}{2} \times 6\frac{1}{2}$ ... | $10 \times 8$ ...                      | 6 0 0               |                            |
| 6 ...   | 10 „             | $8\frac{1}{2} \times 6\frac{1}{2}$ ... | $10 \times 8$ ...                      | $12 \times 10$ ...                     | 8 0 0               |                            |
| 7 ...   | 12 „             | $10 \times 8$ ...                      | $12 \times 10$ ...                     | $15 \times 12$ ...                     | 10 10 0             |                            |
| 8 ...   | 15 „             | $12 \times 10$ ...                     | $15 \times 12$ ...                     | $18 \times 16$ ...                     | 13 10 0             |                            |
| 9 ...   | 18 „             | $13 \times 11$ ...                     | $18 \times 16$ ...                     | $22 \times 18$ ...                     | 18 10 0             |                            |
| 10 ...  | 21 „             | $15 \times 12$ ...                     | $22 \times 18$ ..                      | $25 \times 22$ ...                     | 24 10 0             |                            |
| 11 ...  | 24 „             | $18 \times 16$ ...                     | $25 \times 22$ ...                     | $30 \times 24$ ...                     | 31 10 0             |                            |

**Cost of Pairing two Lenses for Stereoscopic Work, 8s.**

The Single Combinations of the Homocentric Lenses may be used for work requiring lenses of long focus. They give excellent results when used with a small stop on the same sizes of plates as the complete combination for distant Landscapes.

***The above Prices are net.*****SOLD BY ALL LEADING PHOTOGRAPHIC DEALERS.**

**ROSS'**NEW  
PATENT**Homocentric Lenses.****SERIES Da, f8.****For Process, Line, Half-Tone, and Three-  
Colour Work.**Ratio of Stops :  $f/8$   $f/11.3$   $f/16$   $f/22.6$   $f/32$   $f/45$   $f/64$ **Covering and Prices.**

| No.  | Equiv.<br>Focus. | Large<br>Aperture. | Smaller<br>Stops.<br>Up to | In Waterhouse<br>Setting. |       |
|------|------------------|--------------------|----------------------------|---------------------------|-------|
|      |                  |                    |                            | £                         | s. d. |
| Da 7 | 12 inch          | 10 × 8             | 15 × 12                    | 10                        | 10 0  |
| 8    | 15 "             | 12 × 10            | 18 × 16                    | 13                        | 10 0  |
| 9    | 18 "             | 13 × 11            | 22 × 18                    | 18                        | 10 0  |
| 10   | 21 "             | 15 × 12            | 25 × 22                    | 24                        | 10 0  |
| 11   | 24 "             | 18 × 16            | 30 × 24                    | 31                        | 10 0  |

THE HOMOCENTRIC LENS, from its complete zoneless spherical correction, freedom from astigmatism and curvature, is specially adapted for all Process work, including that in Three Colours. The most delicate work is copied, reduced, or enlarged by it with absolute accuracy and sharpness.

**THE ABOVE PRICES ARE NET.****Sold by all Leading Photographic Dealers.**



THE LATEST AND BEST.  
**Ross' Focal Plane Camera.**

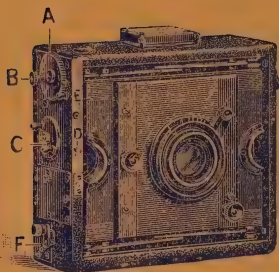
FITTED WITH . .

**ROSS' NEW PATENT HOMOCENTRIC LENS  
 AND IMPROVED FOCAL PLANE SHUTTER,**

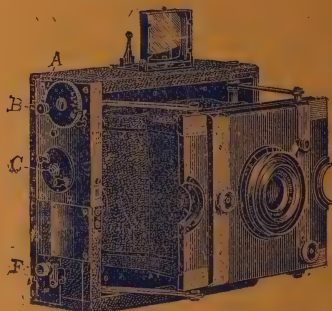
COMBINING

LIGHTNESS. SIMPLICITY.

PORTABILITY. and EFFICIENCY.



ROSS' FOCAL PLANE CAMERA  
 CLOSED.



ROSS' FOCAL PLANE CAMERA  
 OPEN.



**R**OSS' Focal Plane Camera is an extremely compact collapsible Camera, embodying the latest achievements in lens and shutter construction in a simple and practical form, and in such a manner that the highest class work is possible even under the most disadvantageous circumstances.

The Camera is made of ebonised wood exquisitely finished with a dull polish, and the body containing the shutter is covered with morocco leather of the best quality. The extending front, with its **Rising and**

## ROSS' FOCAL PLANE CAMERA

(CONTINUED).

**Falling Lens Board** for vertical and horizontal pictures, is supported by very strong metal arms, which are absolutely rigid when the Camera is open for use. The front is thus kept perfectly plane with the sensitive surface of the plate, and absolute definition is obtained with the largest lens aperture. The new form of **Focal Plane Shutter** gives exposures of from  $1/10$ th to  $1/100$ th of a second at will, and is equally suited for **Time Exposures**, an important improvement which will appeal to those who wish to do indoor portraiture or architectural interiors.

**The Lens.**—The Ross Patent Homocentric Lens fitted to the Focal Plane Camera is unrivalled for crisp and sharp definition at full aperture, and consequently the negatives obtained are such as will bear enlarging to a very great extent. The Lens usually supplied is of the Series C. working at F.6'3, but one of the Series B., F.5'6, may be had at a slight extra cost. For full particulars see pages 38 and 39. The Lens is mounted in a focussing jacket on which the distances from two yards to infinity are accurately engraved, and the Iris diaphragm is marked according to the standards of the Royal Photographic Society.

**The Shutter.**—It is well known that the Focal Plane Shutter has a higher efficiency than any other, and is a *sine qua non* for high speed work. Hitherto this form has not been easily adjustable, nor has it been adapted for time exposures. The Ross Focal Plane Shutter fills every requirement of the practical photographer. The speed can be adjusted in an instant, from the outside, and it is arranged for either time or instantaneous exposures. Moreover, it has the very great range of from  $1/10$ th to  $1/100$ th of a second, consequently it is suitable for photography under any circumstances, and will give better results in a dull light than any other form.

**The Finder.**—This is a folding concave glass, reproducing in miniature the picture taken with the lens. Being ruled with cross lines and supplied with a centering sight it is easy to see if the Camera is held level.

**The Dark Slides.**—The double dark slides are designed to remove the objections pertaining to ordinary dark slides which have either projecting shutters when the plate is exposed or else a loose sheath which has to be withdrawn, leaving an opening through which light enters when the protecting valve happens to be defective. With the roller slides there are no valves or loose parts, the exposure of the plate being made by sliding back a roller shutter which works in the slide itself. They are, moreover, exceedingly small and very light.

**The Ross Changing Box.**—This box may be fitted to the Camera if desired, and is very strongly recommended. It is perfect and rapid in action, the changing of plate or film being accomplished by the simple action of pulling out and closing a drawer without

# ROSS' FOCAL PLANE CAMERA

(CONTINUED).

the necessity of removing the box from the Camera. It holds twelve plates or twenty-four cut films, and may be kept attached to the Camera ready for use.

**Roll Holder.**—A roll holder taking rollable film in cartridge form which may be loaded and unloaded in daylight can be fitted if desired.

## PRICES.

|                                                                                                                                                                                                                                                                            | $\frac{1}{4}$ -plate with<br>5 in. lens. | 5 × 4<br>6 in. lens. | $\frac{1}{4}$ -plate<br>7 in. lens. |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------|----------------------|-------------------------------------|
| Ross' Focal Plane Camera fitted with<br>Ross' Patent Homocentric Lens,<br>Series C, $f$ 6.3, in focussing<br>mount, adjustable Focal Plane<br>shutter for Time or Instantaneous<br>Exposures, Three Roller<br>double dark slides and black<br>leather carrying case ... .. | £ s. d.<br>11 0 0                        | £ s. d.<br>12 0 0    | £ s. d.<br>15 0 0                   |
| Additional double dark slides with<br>special double roller shutters as<br>described, each ... ..                                                                                                                                                                          | 0 12 0                                   | 0 12 0               | 0 15 0                              |
| Extra for Series B, Homocentric<br>Lens $f$ 5.6 ... ..                                                                                                                                                                                                                     | 1 0 0                                    | 1 15 0               | 1 15 0                              |
| Extra for best quality hand-sewn<br>solid leather case with spring<br>lock and key and sling shoulder<br>strap in place of ordinary case<br>as above ... ..                                                                                                                | 0 10 6                                   | 0 12 6               | 0 15 0                              |
| The Ross Changing Box with<br>12 plate sheaths ... ..                                                                                                                                                                                                                      | 2 5 0                                    | 2 5 0                | 3 15 0                              |
| 24 film sheaths ... .. extra                                                                                                                                                                                                                                               | 0 10 0                                   | 0 10 0               | 1 0 0                               |
| Roll Film Holder for loading and<br>unloading in daylight ... ..                                                                                                                                                                                                           | 1 10 0                                   | 1 10 0               | 2 0 0                               |

THE ABOVE PRICES ARE NET.

*For further particulars see Pamphlet sent free on application.*

**ROSS, Ltd.**, 111, New Bond St., London, W.  
OPTICIANS. 31, Cockspur St., Charing Cross, S.W.

# ROSS' Wide=Angle SYMMETRICAL LENSES

For Landscapes, Architecture, and Use in  
Confined Situations.



| Ratio of | $f$ | $f$  | $f$ | $f$  | $f$ |
|----------|-----|------|-----|------|-----|
| Stops.   | 16  | 22.6 | 32  | 45.2 | 64  |

THESE Lenses are remarkably free from distortion and flare, and give sharp definition. They are constructed for  $90^\circ$  and upwards, a wider angle, perhaps, than given by any wide-angle lenses hitherto issued, giving equal definition at the margin of the plate. These Lenses are confidently recommended for architectural subjects and for use in confined situations.

## SIZES AND PRICES.

| No. | Size of Plate<br>with medium<br>Stop. | Size of<br>Plate with<br>full Aperture. | Equ.<br>Focus. | PRICE.          | Code Word. |
|-----|---------------------------------------|-----------------------------------------|----------------|-----------------|------------|
|     |                                       |                                         |                | Brass Settings. |            |
| *1  | 5 × 4                                 | 4½ × 3½                                 | 3 ins.         | £3 0 0          | Ladas      |
| *2  | 7½ × 4½                               | 5 × 4                                   | 4 "            | 3 5 0           | Lebanon    |
| *3  | 8½ × 6½                               | 6½ × 4½                                 | 5 "            | 3 15 0          | Levant *   |
| 4   | 10 × 8                                | 8½ × 6½                                 | 6 "            | 4 10 0          | Lexicon    |
| 5   | 12 × 10                               | 10 × 8                                  | 7 "            | 6 0 0           | Lothair    |
| 6   | 13 × 11                               | 12 × 10                                 | 8 "            | 7 0 0           | Lucy       |
| 7   | 15 × 12                               | 13 × 11                                 | 9 "            | 9 0 0           | Luna       |
| 8   | 18 × 16                               | 15 × 12                                 | 12 "           | 13 0 0          | Lustre     |
| 9   | 22 × 18                               | 18 × 16                                 | 14 "           | 17 0 0          | Lycia      |
| 10  | 25 × 22                               | 22 × 18                                 | 16 "           | 24 0 0          | Lyonia     |

\* These Lenses are supplied accurately paired for Stereoscopic purposes.

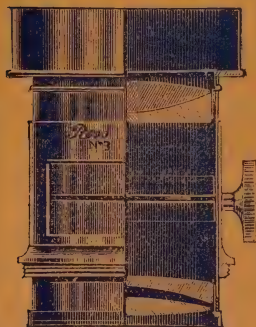
Rotary Diaphragms only are supplied, as there is not sufficient space between the front and back combinations to introduce the Iris diaphragm.

FIVE PER CENT. DISCOUNT FOR CASH.



**ROSS'****RAPID****"Cabinet" Lenses****FOR THE STUDIO.**

+ + +



NO. 3 CABINET LENS.

**R**OSS' "Cabinet" Lenses differ from ordinary Portrait lenses in being constructed to give as flat a field as is consistent with good marginal definition. They are invaluable for the production of either standing or sitting figures with full aperture, and give very rapid results with brilliancy and exquisite defining power.

### CABINET LENSES.

- No. 1 Cabinet Lens,  $2\frac{3}{4}$  inches clear aperture, 6 inches focus ; Code Wd.  
should be placed 14 feet from the sitter ... £12 0 0 Quagga
- No. 2 Ditto ditto,  $3\frac{1}{4}$  inches clear aperture, 8 inches focus ;  
should be placed at 18 feet from the sitter £16 10 0 Queen
- No. 3 Ditto ditto,  $3\frac{1}{2}$  inches clear aperture, 10 inches focus ;  
should be placed at 20 feet from the sitter £18 10 0 Quiver

*The above prices include a set of Waterhouse Diaphragms in morocco case.*

In choosing a Cabinet Lens to obtain the best results it is desirable to use No. 3 when the Studio exceeds 20 feet in length. Many of the finest Cabinet portraits from leading Studios in Paris, London, and New York are taken with this Lens.

**FIVE PER CENT. DISCOUNT FOR CASH.**

**SOLD BY LEADING DEALERS EVERYWHERE.**

### CAUTION.

**E**VERY Lens made by Ross, Ltd., is engraved "ROSS, LONDON," with its stock number, by which it can be verified in the Lens Register. Large numbers of Lenses purporting to be of Ross' manufacture, but which are worthless imitations, are frequently palmed off on the unwary. Ross, Ltd., therefore find it necessary to caution Amateur and Professional Photographers to beware of such fraudulent imitations, and to purchase from the manufacturers direct or through respectable recognised dealers.

# ZEISS' ..

(PATENT)

**"Planar," Unar," and "Protar"**

# .. LENSES

MANUFACTURED BY

## ROSS, Ltd.

*See following pages.*

### IMPORTANT NOTICES.

THE Zeiss Patent Anastigmatic Lenses are manufactured (under Licence) by ROSS, Ltd., at their Optical Works, Clapham Common, EXACTLY TO FORMULÆ SUPPLIED BY CARL ZEISS; and the optical glasses and methods of construction are precisely similar to those employed at Jena, the only difference between the respective lenses being that the Zeiss Anastigmats made by ROSS, Ltd., are mounted in the English style, and furnished with the Standard apertures of the Royal Photographic Society.

THE Objectives, Series VII. and VII.<sup>a</sup> Convertible "Protars"  $f-12.5$  and  $f-6.3$  and Sets of "Protars," as well as the Tele-positives  $f-3$  and the Tele-Combinations formed with them, also the "Planar" and "Unar" lenses (Series I<sup>a</sup> and I<sup>b</sup>), being patented in France, may not be introduced commercially into that country.

# ROSS, LTD.

ESTABLISHED 1830.  
THE OLDEST PHOTOGRAPHIC  
OPTICIANS IN ENGLAND.

Series  
1a.

# ZEISS' ANASTIGMATS.

## (THE PLANAR.)

A Rapid Anastigmatically Corrected Lens.

MANUFACTURED BY

# ROSS, Limited,

Sole Manufacturing Licensees for the British Empire.



Planar F 3, 8.  $f=160$  mm. (6 $\frac{1}{2}$ ).

Series 1a. No. II.

(About two-thirds Full Size.)

THE PLANAR, as shown in the illustration, is a symmetrical objective consisting of four separated lenses. It possesses the following important features: it is very rapid, and yields sharply defined pictures; it is anastigmatically well corrected, and embraces a comparatively wide angle. The rapidity varies from  $f/3.6$  to  $f/6$ , according to the size and application of the lens, and the angle embraced by it varies from  $62^\circ$  to  $72^\circ$ .

The Planars are superior in precision or defining power to the Anastigmats hitherto made. They are therefore pre-eminently adapted for **all kinds of**

**copying processes.** They work equally well when used for enlargements, projection, full-size copies and reductions. Even the finest details are reproduced with a degree of precision which satisfies the highest requirements.

Owing to its extreme rapidity, the Planar is excellently adapted **for the most rapid instantaneous exposures out of doors** (as in the preparation of animated pictures for the kinematograph and similar work), and for **Portraits and Groups** both outdoors and in the studio.

The Planars are, however, not so well adapted for wide-angle architectural and interior views as the Series V. Zeiss Lenses, owing to their greater aperture and consequent smaller angle.

The Planars are supplied in nineteen regular sizes, as specified on next page, which gives all necessary particulars as to size, covering power, and prices.

# Series I<sup>A</sup>.—Zeiss' Anastigmats

## (THE PLANAR.)

A Rapid Special Lens for Instantaneous Photographs, Portraits and Groups, also for Copying, Enlarging and Projections on a Screen.

Manufactured by ROSS, LIMITED.

*Sole Licensees for the British Empire.*

| Series and No. | Equivalent Focus. |                  | Relative Aperture. | Size of Plate covered.               |                                      | In Brass Mount with Iris-Diaphragm. | Code Word. |
|----------------|-------------------|------------------|--------------------|--------------------------------------|--------------------------------------|-------------------------------------|------------|
|                |                   |                  |                    | At full Aperture.                    | With intermediate stops.             |                                     |            |
|                | mm.               | in.              | F.                 | in.                                  | in.                                  | z. s. d.                            |            |
| 1              | 20                | $\frac{3}{8}$    | 4.5                | $\frac{1}{2} \times \frac{1}{2}$     | $\frac{3}{4} \times \frac{3}{4}$     | 5 0 0                               | Placage    |
| 2              | 35                | $\frac{1}{2}$    | 4.5                | $\frac{3}{8} \times \frac{3}{8}$     | $1 \frac{1}{4} \times 1 \frac{1}{4}$ | 5 0 0                               | Placard    |
| 3              | 50                | 2                | 4.5                | $1 \frac{1}{4} \times 1 \frac{1}{4}$ | $1 \frac{3}{4} \times 1 \frac{3}{4}$ | 5 0 0                               | Placenta   |
| 4              | 75                | 3                | 4.5                | $1 \frac{3}{8} \times 1 \frac{3}{8}$ | $2 \frac{1}{2} \times 2 \frac{1}{2}$ | 6 0 0                               | Placet     |
| 5              | 100               | 4                | 4.5                | $2 \frac{1}{2} \times 2 \frac{1}{2}$ | $3 \frac{1}{4} \times 3 \frac{1}{4}$ | 6 0 0                               | Placitum   |
| 6              | 40                | $1 \frac{1}{8}$  | 3.6                | $1 \times 1$                         | $1 \frac{1}{2} \times 1 \frac{1}{2}$ | 5 0 0                               | Placadus   |
| 7              | 60                | $2 \frac{1}{8}$  | 3.6                | $1 \frac{1}{8} \times 1 \frac{1}{8}$ | $2 \frac{3}{8} \times 2 \frac{3}{8}$ | 5 0 0                               | Plafond    |
| 8              | 83                | $3 \frac{1}{4}$  | 3.6                | $2 \times 2$                         | $3 \frac{1}{4} \times 2 \frac{3}{4}$ | 6 0 0                               | Plagiat    |
| 9              | 110               | $4 \frac{1}{2}$  | 3.6                | $3 \frac{1}{4} \times 2 \frac{1}{2}$ | $4 \frac{1}{4} \times 3 \frac{1}{4}$ | 7 10 0                              | Plagium    |
| 10             | 130               | 5                | 3.8                | $3 \frac{1}{4} \times 3 \frac{1}{4}$ | $5 \times 4$                         | 9 0 0                               | Plakoid    |
| 11             | 150               | $6 \frac{1}{4}$  | 3.8                | $4 \frac{1}{4} \times 3 \frac{1}{4}$ | $6 \frac{1}{4} \times 4 \frac{3}{4}$ | 11 0 0                              | Planeta    |
| 12             | 205               | 8                | 4.0                | $6 \frac{1}{2} \times 4 \frac{1}{4}$ | $7 \frac{1}{2} \times 5$             | 15 10 0                             | Planum     |
| 13             | 250               | 10               | 4.0                | $7 \frac{1}{2} \times 5$             | $9 \times 7$                         | 21 10 0                             | Piasma     |
| 14             | 300               | 12               | 4.2                | $8 \frac{1}{2} \times 6 \frac{1}{2}$ | $10 \times 8$                        | 27 10 0                             | Plastic    |
| 15             | 370               | $14 \frac{1}{2}$ | 4.5                | $9 \times 7$                         | $16 \times 12$                       | 34 10 0                             | Plastron   |
| 16             | 423               | $16 \frac{3}{4}$ | 4.5                | $10 \times 8$                        | $18 \times 14$                       | 43 0 0                              | Plata      |
| 17             | 470               | $18 \frac{1}{2}$ | 5.0                | $12 \times 9 \frac{1}{2}$            | $20 \times 16$                       | 50 0 0                              | Platanus   |
| 18             | 610               | 24               | 5.0                | $16 \times 12$                       | $24 \times 20$                       | 100 0 0                             | Platinid   |
| 19             | 840               | 33               | 6.0                | $20 \times 16$                       | $32 \times 26$                       | 175 0 0                             | Platon     |

In consequence of the large aperture of the "Planar," it is extremely sensitive, and great care must therefore be given to delicate focussing to insure the best results.

Neither Front nor Back combinations can be used as a single landscape lens except with very small stops.

The cost of pairing two Lenses for Stereoscopic Work is 8s.

**THE ABOVE PRICES ARE NET.**

**SOLD BY LEADING DEALERS EVERYWHERE.**



SERIES IB.

# ZEISS “UNAR” LENSES

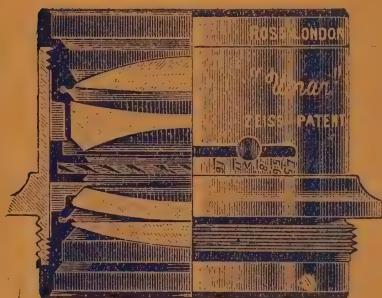
(PATENT.)

The Newest Type of Zeiss Photographic Objective of Large Aperture with Anastigmatic flatness of field.

ROSS, LONDON,

Sole British Makers of  
“Unar” and other Zeiss  
Lenses.

THE “UNAR” LENS is intended to provide Amateur and Professional Photographers with an objective of extreme rapidity, combined with a field exceeding  $60^\circ$ , which is very flat and evenly illuminated.



THE “UNAR” LENS is constructed of hard, colourless Jena Glass of a very permanent character, and it is remarkable for its uniformly crisp definition from the centre to the margin of the field, hitherto unapproached in lenses of such large aperture, with the exception of the “Planar” lenses, which have still larger apertures.

THE “UNAR” LENS is believed to be the most universal lens now in the market that either Professional or Amateur Photographer can possess, the price being at the same time moderate for such a high-class instrument.

THE “UNAR” LENS is specially recommended for all work requiring great intensity of light, such as rapid Hand Camera Work, Portraits, Groups, and photography under unfavourable conditions of lighting. It is also well suited for Enlargements and Reproductions.

NOTE.—All “Unar” Lenses made by Ross, Limited, are guaranteed to be optically similar in quality to those of Carl Zeiss’ own make, but Ross-made Lenses are mounted in their usual English style, with the series of Stops adopted as the Standard by the Royal Photographic Society.

# The "UNAR" Lenses,

## WITH IRIS DIAPHRAGM.

### Series 1<sup>B</sup>.

| Series. | Dia. of Lenses. |     | Equiv. Focus. |     | Rel. Apert. | Avail. angle. | Plate covered.  |              | Price.  | Code Word. |
|---------|-----------------|-----|---------------|-----|-------------|---------------|-----------------|--------------|---------|------------|
|         |                 |     |               |     |             |               | Large Aperture. | Medium Stop. |         |            |
| No.     | mm.             | in. | mm.           | in. |             |               | in.             | in.          | £ s. d. |            |
| 3       | 25              | 1   | 112           | 4½  | f4.5        | 65            | 3½ × 2½         | 4 × 3½       | 4 10 0  | Undine.    |
| 4       | 31              | 1½  | 136           | 5½  | f4.5        | 65            | 4 × 3½          | 4½ × 3½      | 5 10 0  | Ungko.     |
| 5       | 31              | 1   | 155           | 6   | f5          | 65            | 4½ × 3½         | 6½ × 4½      | 6 0 0   | Ungvar.    |
| 6       | 42              | 1¾  | 210           | 8½  | f5          | 65            | 6½ × 4½         | 7 × 5        | 9 0 0   | Unimak.    |
| 7       | 51              | 2   | 255           | 10  | f5          | 65            | 7 × 5           | 8½ × 6½      | 13 0 0  | Unit.      |
| 8       | 61              | 2½  | 305           | 12  | f5          | 65            | 8½ × 6½         | 9½ × 7½      | 18 0 0  | Univers.   |
| 9       | 71              | 2¾  | 375           | 15  | f5.3        | 65            | 10 × 8          | 12 × 10      | 23 10 0 | Unpro.     |
| 10      | 82              | 3¼  | 450           | 18  | f5.0        | 65            | 12 × 10         | 14 × 11      | 30 0 0  | Unze.      |

The front and back lenses of the "Unar" are not corrected separately for use as single lenses.

In consequence of the success attained by the "Unar" f4.5 to f5 Lenses since their introduction, Carl Zeiss have issued a new series of "Unar" Lenses with a light intensity of f6.3.

| Series. | Dia. of Lenses. |     | Equiv. Focus. |     | Rel. Apert. | Avail. angle. | Plate covered.  |              | Price in Iris Setting. | Code Word. |
|---------|-----------------|-----|---------------|-----|-------------|---------------|-----------------|--------------|------------------------|------------|
|         |                 |     |               |     |             |               | Large Aperture. | Medium Stop. |                        |            |
| No.     | mm.             | in. | mm.           | in. |             |               | in.             | in.          | £ s. d.                |            |
| 13      | 19              | ¾   | 112           | 4½  | f6.3        | 65°           | 3½ × 2½         | 4 × 3½       | 4 0 0                  | Unala.     |
| 14      | 22.5            | 1   | 136           | 5½  | "           | "             | 4½ × 3½         | 5 × 4        | 4 5 0                  | Unama.     |
| 14a     | 22.5            | 1   | 145           | 5½  | "           | "             | 4½ × 3½         | 5½ × 4½      | 4 10 0                 | Unaste.    |
| 15      | 25              | 1   | 155           | 6   | "           | "             | 5 × 4           | 6 × 4½       | 5 5 0                  | Unavo.     |
| 15a     | 31              | 1½  | 180           | 7½  | "           | "             | 6½ × 4½         | 7 × 5        | 6 5 0                  | Unazal.    |
| 16      | 35              | 1¾  | 210           | 8½  | "           | "             | 7 × 5           | 8½ × 5       | 7 15 0                 | Unazeto.   |
| 17      | 42              | 1¾  | 255           | 10  | "           | "             | 8½ × 5          | 8½ × 6½      | 10 0 0                 | Unazir.    |
| 18      | 51              | 2   | 305           | 12  | "           | "             | 8½ × 6½         | 9½ × 7½      | 15 0 0                 | Unazost.   |

The Front and Back Lenses of the f6.3 "Unar" are not corrected separately for use as single Lenses.

THE ABOVE PRICES ARE NET.

## For HAND CAMERAS with fixed extension

in which the shutter works either directly in front of the sensitive plate or directly behind the objective.

# "UNARS"

are supplied in special  
mount A,

(as illustrated),

which is provided with

IRIS DIAPHRAGM and  
FOCUSSING COLLAR.



| Series. | Dia. of Lenses. | Equiv. focus. | For Plates. | Special Mount. | Objective in special mount A. |            |
|---------|-----------------|---------------|-------------|----------------|-------------------------------|------------|
|         |                 |               |             |                | Price.                        | Code Word. |
| No.     | in.             | in.           | i.          | No.            | £ s. d.                       |            |
| 1b, 3   | 1               | 4½            | 3½ × 2½     | A <sub>2</sub> | 5 0 0                         | Uspal.     |
| 1b, 4   | 1½              | 5½            | 4 × 3½      | A <sub>3</sub> | 6 5 0                         | Uspafa.    |
| 1b, 5   | 2½              | 6             | 4½ × 3½     | A <sub>4</sub> | 6 15 0                        | Usperial.  |

Objectives with special mounts A cannot be used in conjunction with Hand Cameras where the Shutter works between the lenses of the Objective.

For Snapshots with small plates, Nos. 3, 4, and 5 are recommended.

No. 3 "Unar" ... 4½ in. focus,  $f$  4'5 is suitable for 3½ × 2½ to 4 × 3½ in.  
 " 4 " ... 5½ in. "  $f$  4'5 " 4 × 3½ to 4½ × 3½ in.  
 " 5 " ... 6 in. "  $f$  5 " 4½ × 3½ to 6½ × 4½ in.

Nos. 6, 7, and 8 are suitable for Portraits:—

No. 6 "Unar" ... 8½ in. focus,  $f$  5 for full length Carte-de-Visite.  
 " 7 " ... 10 in. "  $f$  5 for Carte-de-Visite Busts.  
 " 8 " ... 12 in. "  $f$  5 for Cabinet Busts.

For taking Groups:—No 6 should be used with Plates 6½ × 4½ in. to 7½ × 5½ in.

" 7 " " " " " 7½ × 5½ in. to 8½ × 6½ in.

" 8 " " " " " 8½ × 6½ in. to 9½ × 7½ in.

For Landscape work it should be remembered that it is advisable to select an Objective with sufficient focal length, so that the proportions of distant objects are not too greatly reduced.

## THE ABOVE PRICES ARE NET.

SOLD BY LEADING DEALERS EVERYWHERE.

## SERIES IIIa.

## Zeiss' "Protar," F:8.



MANUFACTURED BY

**ROSS, Limited,***Sole Licensees for the British Empire*

**A High-Class Rapid Wide-  
Angle Lens for General  
Outdoor Work.**

THESE Lenses are perfectly compensated for Astigmatism, and embrace, with the smaller stops, an angle of about 97 degrees. The smaller sizes are specially suitable for Hand Cameras.

| RATIO OF STOPS | F | F    | F  | F    | F  | F  | F  |
|----------------|---|------|----|------|----|----|----|
|                | 8 | 11.3 | 16 | 22.6 | 32 | 45 | 64 |

**PRICES.**

| No. | Equiv.<br>focus.<br>m/m. | Equiv.<br>Inches. | Plate<br>covered<br>sharply<br>at F/8. | Plate<br>covered<br>sharply<br>at f/11.3. | Plate<br>covered<br>sharply<br>at f/22. | Brass Mounts<br>with Iris<br>Diaphragms. | Code<br>Word. |
|-----|--------------------------|-------------------|----------------------------------------|-------------------------------------------|-----------------------------------------|------------------------------------------|---------------|
|     |                          |                   | Inches.                                | Inches.                                   | Inches.                                 |                                          |               |
| 1   | 120                      | 4 1/2             | 3 1/4 x 3 1/4                          | 4 1/4 x 3 1/4                             | 5 x 4                                   | £3 5 0                                   | Galone        |
| 2   | 150                      | 6                 | 4 1/4 x 3 1/4                          | 5 x 4                                     | 6 1/2 x 4 1/2                           | 3 15 0                                   | Gamma         |
| 3   | 172                      | 6 3/4             | 5 x 4                                  | 6 1/2 x 4 1/2                             | 8 x 5                                   | 4 10 0                                   | Gardine       |
| 4   | 196                      | 7 1/2             | 6 1/4 x 4 1/4                          | 8 x 5                                     | 8 1/2 x 6 1/2                           | 5 0 0                                    | Garter        |
| 5   | 230                      | 9 1/4             | 8 x 5                                  | 8 1/2 x 6 1/2                             | 9 x 7                                   | 6 10 0                                   | Gazelle       |
| 6   | 272                      | 10 3/4            | 9 x 6 1/2                              | 9 x 7                                     | 10 x 8                                  | 8 0 0                                    | Genius        |
| 7   | 317                      | 12 1/2            | 9 x 7                                  | 10 x 8                                    | 12 x 10                                 | 10 0 0                                   | Gilde         |
| 8   | 407                      | 16 1/4            | 10 x 8                                 | 12 x 10                                   | 13 x 11                                 | 15 0 0                                   | Giraffe       |
| 9   | 505                      | 20                | 12 x 10                                | 13 x 11                                   | 15 x 12                                 | 20 0 0                                   | Gloria        |
| 10  | 600                      | 24                | 13 x 11                                | 15 x 12                                   | 18 x 16                                 | 25 0 0                                   | Gnom          |
| 11  | 690                      | 27 1/2            | 15 x 12                                | 18 x 16                                   | 22 x 18                                 | 32 10 0                                  | Gondel        |
| 12  | 820                      | 32 1/2            | 18 x 16                                | 22 x 18                                   | 25 x 22                                 | 40 0 0                                   | Gral          |

These Lenses are kept in stock with Iris Diaphragms only. If Waterhouse Diaphragms are required, the lenses will be specially mounted, at the same prices as for Iris.

The cost of pairing two Lenses for stereoscopic work is 8/-.

**THE ABOVE PRICES ARE NET.**

**Sold by leading Dealers everywhere.**



# SERIES VII., *f*. 12·5, CONVERTIBLE SINGLE “PROTAR” LENSES.

(ZEISS' PATENT.)

Manufactured by ROSS, Ltd.

(*Sole Manufacturing Licenceses for the British Empire.*)



Admirably adapted for Portraits, Groups, Landscapes, and every class of Photography, in the Studio or out of doors, when used either Singly or Combined as in Series VIIa. They are unapproached by any other Single Lens in existence.

THE “relative rapidity” of this Anastigmatic Lens is *F* 12·5, and the field embraced is about 85°. The anastigmatic flatness of the image is unapproachable in any Single Landscape Lens hitherto produced, while the marginal distortion when used on a moderate angle is practically inappreciable. The Lens is therefore suitable for instantaneous outdoor pictures such as landscapes and seascapes, and also for large portraits and groups in a good light.

ENGLISH RATIO OF STOPS—*f* 12·5, *f* 16, *f* 21·6, *f* 32, *f* 45, *f* 64.

| No. | Equivalent focus. |      | Plate covered, <i>f</i> 12·5. |       | Price with Iris Diaphragm. | Code Word. |
|-----|-------------------|------|-------------------------------|-------|----------------------------|------------|
|     | mm.               | Ins. | c.m.                          | Ins.  |                            |            |
| 0   | 100               | 4    | 6×9                           | 3½×2½ | 4 10 0                     | Abdera     |
| 00  | 135               | 5½   | 7×10                          | 4×2½  | 4 10 0                     | Absynth    |
| 000 | 170               | 6½   | 9×12                          | 4½×3  | 4 10 0                     | Abydos     |
| I   | 183               | 7½   | 12×15                         | 6½×4½ | 3 15 0                     | Acacia     |
| 2   | 224               | 9    | 13×18                         | 7½×5  | 4 5 0                      | Acarina    |
| 3   | 285               | 11½  | 16×21                         | 8½×6½ | 5 0 0                      | Aceton     |
| 4   | 350               | 14   | 21×27                         | 10×8  | 6 0 0                      | Achilles   |
| 5   | 412               | 16½  | 24×30                         | 12×10 | 7 15 0                     | Acidalia   |
| 6   | 480               | 19½  | 29×34                         | 13×11 | 10 15 0                    | Aconitum   |
| 7   | 590               | 23½  | 30×40                         | 15×12 | 13 15 0                    | Adinol     |
| 8   | 660               | 27½  | 34×39                         | 15×12 | 18 0 0                     | Aeneas     |
| 9   | 782               | 30½  | 39×47                         | 18×16 | 25 0 0                     | Aeolus     |
| 10  | 862               | 34   | 40×50                         | 20×16 | 32 10 0                    | Aequator   |
| 11  | 1000              | 39   | 47×57                         | 22×18 | 42 10 0                    | Aether     |

THE ABOVE PRICES ARE FOR NET PROMPT CASH.

SOLD BY LEADING DEALERS EVERYWHERE.

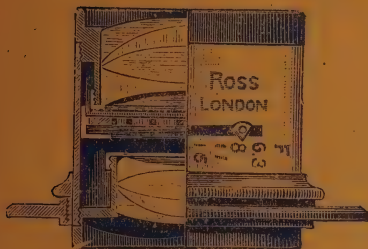
*For Rapid and Extra Rapid Doublets and Sets formed from the above Series of Single Lenses, see five following pages.*

SERIES VIIa.

# Convertible "Protars"

F6·3. (ZEISS' PATENT.)

Manufactured by ROSS, Ltd.



**Rapid Universal Lenses  
for Portraits, Groups,  
and Wide-angle Instantaneous  
Photographs,  
also for Architecture,  
Landscapes, Process  
Work, and Copying.**

THESE Lenses are composed of two single combinations of the Series VII., and, like other symmetrical lenses, are free from distortion. Either of the components may be used singly, as in the Series VII.; a screen ring being provided to screw in the front of the mount in place of the combination removed, so as to intercept reflected light. The settings are furnished with Iris diaphragms, the stops being marked off both for the doublets and the single combinations. A variety of other foci ( $f8$ ) are available by combining suitable dissimilar single lenses; in all, thirty doublets are formed from the combination of the eleven single lenses of the Series VII. Anyone possessed of a doublet ( $f6\cdot3$ ) can, therefore, be supplied with one or two more single lenses to combine in the manner shown on the next two pages. An alteration to the setting is necessary for this conversion to provide the divisions showing apertures of the stops for the resulting foci. This modification consists of the adaptation of a movable ring, so constructed that the engraving on it and the setting indicates four or seven series of apertures, as the case may require. The price charged for this adaptation and engraving is  $7/6$  for two single lenses of different foci, with  $2/6$  extra for each additional single lens. The stops in all the lenses we manufacture are, for greater convenience, marked off in accordance with the form generally accepted in England, each aperture requiring double the exposure of the next larger.

**For Prices of Various Combinations see two next pages.**

# Series VIIa. CONVERTIBLE

Made by ROSS, Limited, Sole Manu-

Universal Series of Lenses specially suitable for Portraits and groups in the

These Lenses are formed by combining suitable single Lenses

| No. | COMBINATION OF TWO LENSES.<br><i>f/12.5</i> |                  |            |                  | Resulting<br>Combined Focus. |                  | Largest<br>Aperture. | SIZE                           |                 |
|-----|---------------------------------------------|------------------|------------|------------------|------------------------------|------------------|----------------------|--------------------------------|-----------------|
|     | Front Lens.                                 |                  | Back Lens. |                  | mm.                          | ins.             |                      | At<br>Full Aperture<br>Inches. |                 |
|     | mm.                                         | ins.             | mm.        | ins.             |                              |                  |                      |                                |                 |
| 0   | 100                                         | 4                | 100        | 4                | 61                           | 2 $\frac{3}{8}$  | 6.3                  | 1 $\frac{1}{2}$ ×              | 1 $\frac{1}{2}$ |
| 00  | 135                                         | 5 $\frac{3}{8}$  | 135        | 5 $\frac{3}{8}$  | 82                           | 3 $\frac{1}{4}$  | 6.3                  | 2 ×                            | 2               |
| 000 | 170                                         | 6 $\frac{3}{4}$  | 170        | 6 $\frac{3}{4}$  | 102                          | 4                | 6.3                  | 2 $\frac{3}{8}$ ×              | 2 $\frac{3}{8}$ |
| 1   | 183                                         | 7 $\frac{1}{4}$  | 183        | 7 $\frac{1}{4}$  | 105                          | 4 $\frac{1}{8}$  | 6.3                  | 3 $\frac{1}{4}$ ×              | 3 $\frac{1}{4}$ |
| 2   | 224                                         | 9                | 183        | 7 $\frac{1}{4}$  | 115                          | 4 $\frac{1}{2}$  | 7                    | 4 $\frac{1}{4}$ ×              | 3 $\frac{1}{4}$ |
| 3   | 285                                         | 11 $\frac{1}{2}$ | 183        | 7 $\frac{1}{4}$  | 127                          | 5                | 8                    | 5 ×                            | 4               |
| 4   | 224                                         | 9                | 224        | 9                | 128                          | 5                | 6.3                  | 5 ×                            | 4               |
| 5   | 285                                         | 11 $\frac{1}{2}$ | 224        | 9                | 143                          | 5 $\frac{3}{4}$  | 7                    | 6 ×                            | 5               |
| 6   | 350                                         | 14               | 224        | 9                | 156                          | 6                | 8                    | 6 ×                            | 5               |
| 7   | 285                                         | 11 $\frac{1}{2}$ | 285        | 11 $\frac{1}{2}$ | 163                          | 6 $\frac{1}{2}$  | 6.3                  | 6 $\frac{1}{2}$ ×              | 4 $\frac{3}{4}$ |
| 8   | 350                                         | 14               | 285        | 11 $\frac{1}{2}$ | 179                          | 7                | 7                    | 7 $\frac{1}{2}$ ×              | 5               |
| 9   | 412                                         | 16 $\frac{1}{2}$ | 285        | 11 $\frac{1}{2}$ | 192                          | 7 $\frac{1}{2}$  | 8                    | 8 ×                            | 5               |
| 10  | 350                                         | 14               | 350        | 14               | 200                          | 8                | 6.3                  | 8 ×                            | 5               |
| 11  | 412                                         | 16 $\frac{1}{2}$ | 350        | 14               | 216                          | 8 $\frac{1}{2}$  | 7                    | 8 $\frac{1}{2}$ ×              | 6 $\frac{1}{2}$ |
| 12  | 480                                         | 19 $\frac{1}{4}$ | 350        | 14               | 232                          | 9                | 8                    | 8 $\frac{1}{2}$ ×              | 6 $\frac{1}{2}$ |
| 13  | 412                                         | 16 $\frac{1}{2}$ | 412        | 16 $\frac{1}{2}$ | 235                          | 9 $\frac{1}{4}$  | 6.3                  | 8 $\frac{1}{2}$ ×              | 6 $\frac{1}{2}$ |
| 14  | 480                                         | 19 $\frac{1}{4}$ | 412        | 16 $\frac{1}{2}$ | 254                          | 10               | 7                    | 9 ×                            | 7               |
| 15  | 590                                         | 23 $\frac{1}{2}$ | 412        | 16 $\frac{1}{2}$ | 277                          | 11               | 8                    | 9 ×                            | 7               |
| 16  | 480                                         | 19 $\frac{1}{4}$ | 480        | 19 $\frac{1}{4}$ | 275                          | 11               | 6.3                  | 9 ×                            | 7               |
| 17  | 590                                         | 23 $\frac{1}{2}$ | 480        | 19 $\frac{1}{4}$ | 303                          | 12               | 7                    | 10 ×                           | 8               |
| 18  | 690                                         | 27 $\frac{1}{2}$ | 480        | 19 $\frac{1}{4}$ | 324                          | 12 $\frac{3}{4}$ | 8                    | 10 ×                           | 8               |
| 19  | 590                                         | 23 $\frac{1}{2}$ | 590        | 23 $\frac{1}{2}$ | 337                          | 13 $\frac{1}{4}$ | 6.3                  | 10 ×                           | 8               |
| 20  | 690                                         | 27 $\frac{1}{2}$ | 590        | 23 $\frac{1}{2}$ | 364                          | 14 $\frac{1}{2}$ | 7                    | 12 ×                           | 10              |
| 22  | 690                                         | 27 $\frac{1}{2}$ | 690        | 27 $\frac{1}{2}$ | 395                          | 15 $\frac{1}{2}$ | 6.3                  | 12 ×                           | 10              |
| 25  | 782                                         | 30 $\frac{1}{2}$ | 782        | 30 $\frac{1}{2}$ | 465                          | 18 $\frac{1}{4}$ | 6.3                  | 13 ×                           | 11              |
| 28  | 862                                         | 34               | 862        | 34               | 515                          | 20 $\frac{1}{4}$ | 6.3                  | 13 ×                           | 11              |
| 30  | 1000                                        | 39               | 1000       | 39               | 595                          | 23 $\frac{1}{2}$ | 6.3                  | 15 ×                           | 12              |

The above Prices are for Net Prompt Cash. For

# “PROTAR” LENSES, F:6·3

(Zeiss' Patent.)

facturing Licensees for the British Empire.

Studio, and for all Classes of Outdoor Photography, also for Interiors, Copying, &c.

of Series VII. (f/12·5), as described on the preceding pages.

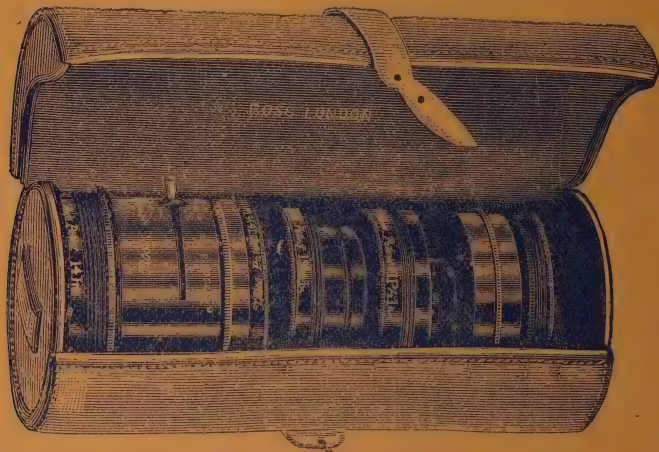
| OF PLATES COVERED.    |                       | PRICES IN LONDON.                |         | Cable<br>Code Word. | No. |
|-----------------------|-----------------------|----------------------------------|---------|---------------------|-----|
| At f/11·3.<br>Inches. | At f/22·6.<br>Inches. | In Brass Settings,<br>with Iris. | £ s. d. |                     |     |
| 2 × 1½                | 2½ × 2                | 8 15 0                           |         | Accord              | 0   |
| 2½ × 2½               | 3 × 2½                | 8 15 0                           |         | Agathe              | 00  |
| 3½ × 2½               | 4 × 3                 | 8 15 0                           |         | Agnes               | 000 |
| 5 × 4                 | 5 × 4                 | 7 5 0                            |         | Agonie              | 1   |
| 6 × 5                 | 6 × 5                 | 7 15 0                           |         | Alabaster           | 2   |
| 6½ × 4½               | 6½ × 4½               | 8 10 0                           |         | Alauda              | 3   |
| 7½ × 5                | 7½ × 5                | 8 5 0                            |         | Albatros            | 4   |
| 8 × 5                 | 8 × 5                 | 9 0 0                            |         | Alizarin            | 5   |
| 8 × 5                 | 8½ × 6½               | 10 0 0                           |         | Alkaloid            | 6   |
| 8½ × 6½               | 8½ × 6½               | 9 15 0                           |         | Alkohol             | 7   |
| 8½ × 6½               | 9 × 7                 | 10 15 0                          |         | Amidon              | 8   |
| 9 × 7                 | 9 × 7                 | 12 10 0                          |         | Ananas              | 9   |
| 9 × 7                 | 10 × 8                | 11 15 0                          |         | Anchovis            | 10  |
| 10 × 8                | 10 × 8                | 13 10 0                          |         | Anilin              | 11  |
| 10 × 8                | 12 × 10               | 16 10 0                          |         | Anthracit           | 12  |
| 10 × 8                | 12 × 10               | 15 5 0                           |         | Antimon             | 13  |
| 12 × 10               | 12 × 10               | 18 5 0                           |         | Antipyrin           | 14  |
| 12 × 10               | 12 × 10               | 21 5 0                           |         | Apostat             | 15  |
| 12 × 10               | 12 × 10               | 21 0 0                           |         | Aristos             | 16  |
| 12 × 10               | 13 × 11               | 24 0 0                           |         | Asbest              | 17  |
| 13 × 11               | 13 × 11               | 28 5 0                           |         | Athene              | 18  |
| 13 × 11               | 13 × 11               | 27 0 0                           |         | Atlas               | 19  |
| 13 × 11               | 15 × 12               | 31 5 0                           |         | Atropin             | 20  |
| 13 × 11               | 15 × 12               | 35 10 0                          |         | Aurora              | 22  |
| 15 × 12               | 18 × 16               | 49 10 0                          |         | Aurum               | 25  |
| 15 × 12               | 18 × 16               | 64 10 0                          |         | Ave                 | 28  |
| 18 × 16               | 22 × 18               | 84 10 0                          |         | Azalie              | 30  |

Sets of Convertible “Protars” see following Page.



# Sets of Convertible "Protars."

Composed of Anastigmatic Lenses,  $f/12.5$ , Series VII.  
(Zeiss' Patent.)



**S**ETS of lenses affording a considerable variety of Rapid combinations of various focal lengths can be readily selected from Table VIIA. These sets, consisting of few component Rapid and Anastigmatic lenses, provide a series working at  $f/6.3$ ,  $f/8$  and  $f/12.5$  of very high efficiency for all photographic purposes.

Of these sets of "Protars" we keep in stock those suitable for half-plate and whole-plate, and any of the other combinations we can only undertake to supply in a reasonable time after receiving definite order.

Each of the Stock Sets consists of—

1. A special setting fitted with Iris diaphragm so arranged that either of the combinations may be screwed into back or front as desired.
2. Three or four single "Protars"  $f/12.5$ , each cell being engraved with the focal length.
3. A "screen ring" to intercept any reflected light when a single lens only is in use.
4. A portable case to contain lenses and setting.

When these lenses are used as Single "Protars" they must be inserted into the back of the setting and the "screen ring" screwed into the front. When two lenses are to be used in combination the "screen ring" is replaced by the second lens, or in the case of two different focal lengths, by the longer of the two, as in this way the largest possible relative opening of the doublet is obtained.

**SET C.**For Plates  $6\frac{1}{2} \times 4\frac{3}{4}$  or  $7\frac{1}{2} \times 5$  inches.

Consisting of Single Lenses Nos. 2, 3, and 4, Series VII., with setting and screen ring complete in Leather Case.

| No. | Front Lens.<br>Inches. | Back Lens.<br>Inches. | Combined Focus.<br>Inches. | Largest Aperture. | Plate Covered.<br>Inches.          | Price £14 15s., with 10/- extra for additional Ring and Scales of Apertures.* | Code Word, Alpha. |
|-----|------------------------|-----------------------|----------------------------|-------------------|------------------------------------|-------------------------------------------------------------------------------|-------------------|
| 1   |                        | 9                     | 9                          | 12'5              | $7\frac{1}{2} \times 5$            |                                                                               |                   |
| 2   |                        | $11\frac{1}{2}$       | $11\frac{1}{2}$            | 12'5              | $8\frac{1}{2} \times 6\frac{1}{2}$ |                                                                               |                   |
| 3   |                        | 14                    | 14                         | 12'5              | $10 \times 8$                      |                                                                               |                   |
| 4   | $11\frac{1}{2}$        | 9                     | 5                          | 7                 | $6 \times 5$                       |                                                                               |                   |
| 5   | 14                     | 9                     | 6                          | 8                 | $6\frac{1}{2} \times 4\frac{1}{2}$ |                                                                               |                   |
| 6   | $11\frac{1}{2}$        | $11\frac{1}{2}$       | 7                          | 7                 | $7\frac{1}{2} \times 5$            |                                                                               |                   |

PRICES ARE STRICTLY NET.

**SET D.**For Plates  $8\frac{1}{2} \times 6\frac{1}{2}$  or  $9 \times 7$  inches.

Consisting of Single Lenses Nos. 3, 4, 5, and 6, Series VII., with setting and screen ring complete in Leather Case.

| No. | Front Lens.<br>Inches. | Back Lens.<br>Inches. | Combined Focus.<br>Inches. | Largest Aperture. | Plate Covered.<br>Inches.          | Price £28 15s., with 15/- extra for additional Ring and Scales of Apertures.* | Code Word, Alphabet. |
|-----|------------------------|-----------------------|----------------------------|-------------------|------------------------------------|-------------------------------------------------------------------------------|----------------------|
| 1   |                        | $11\frac{1}{2}$       | $11\frac{1}{2}$            | 12'5              | $8\frac{1}{2} \times 6\frac{1}{2}$ |                                                                               |                      |
| 2   |                        | 14                    | 14                         | 12'5              | $10 \times 8$                      |                                                                               |                      |
| 3   |                        | $16\frac{1}{2}$       | $16\frac{1}{2}$            | 12'5              | $12 \times 10$                     |                                                                               |                      |
| 4   |                        | 19                    | 19                         | 12'5              | $13 \times 11$                     |                                                                               |                      |
| 5   | 14                     | $11\frac{1}{2}$       | 7                          | 7                 | $7\frac{1}{2} \times 5$            |                                                                               |                      |
| 6   | $16\frac{1}{2}$        | 11                    | $7\frac{1}{2}$             | 8                 | $8 \times 5$                       |                                                                               |                      |
| 7   | $16\frac{1}{2}$        | 14                    | $8\frac{1}{2}$             | 7                 | $8\frac{1}{2} \times 6\frac{1}{2}$ |                                                                               |                      |
| 8   | 19                     | 14                    | 9                          | 8                 | $8\frac{1}{2} \times 6\frac{1}{2}$ |                                                                               |                      |
| 9   | $19\frac{1}{2}$        | $16\frac{1}{2}$       | 10                         | 7                 | $9 \times 7$                       |                                                                               |                      |

PRICES ARE STRICTLY NET.

\* To make intricate calculations unnecessary, and to simplify the fixing of the different apertures when several combinations of Series VII. are used in the same setting, we have adopted a special arrangement by which a revolving click ring is supplied with each setting. The lenses of Series VIIa, when supplied with similar ends, each  $f/6\frac{1}{3}$ , will not require this ring, and will only be engraved for the stops of the complete combination; the extra ring not being required in this case there will be no extra charge. If one such doublet has a dissimilar combination added afterwards, the setting (which is so made to allow of this) will require to have this ring added with the necessary scale of stops for the additional single lens, and for those of the combination it forms with one or other of the original combinations. For this additional ring and scale a charge of  $7/6$  will be made. Should two additional single lenses be ordered, the extra charge for the ring and scales will be 10/-. A set of three dissimilar ends ordered at the same time will, therefore, be subject to an extra charge of 10/- on the original prices, as a ring and six sets of engraved scales would have to be supplied.

~~~~~  
 SOLD BY LEADING DEALERS EVERYWHERE.

ZEISS' TELE-OBJECTIVES.

Patented in Germany, Great Britain, the United States, &c.

Tube-mount.

Tele-Negative 1:2.

No.	NET PRICE.		Code-word.	No.	Diameter of lenses mm.	Focus mm.	NET PRICE.	Code-word.
III. IV.	£	s. d.	Ration. Katte.					
	5	0 0		1	15	27	2 0 0	Realitas
	9	0 0		2	24	45	2 10 0	Record
				3	30	58	3 10 0	Regulus
				4	37	75	5 0 0	Remedium
				5	50	100	7 10 0	Reptila
				6	63	125	11 0 0	Relais

Tele-Positive 1:3.*

No.	Diameter of lenses mm.	Focus mm.	NET PRICE.	Code-word.
1	45	135	£ s. d. 6 15 0	Raffnade
2	75	225	20 0 0	Raphael
3	125	375	50 0 0	Reaction

* The Tele-Positives must not be imported into France commercially.

Adapters for the Combined use of the Tube-mounts and Anastigmat Lenses, 5/- to 10/- each.

A. SPECIFICATION

of Tele-photographic Combinations adapted
for Mount-tube III.

B. SPECIFICATION

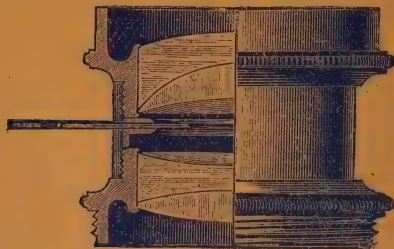
of Tele-photographic Combinations adapted
for Tube-mount IV.

No.	Positive Element.	Focus mm.	Neg. Elem.	NET PRICE.	Code- word.	For	Positive Element.	Focus mm.	Neg. Elem.	NET PRICE.	Code- word.	No.
1*	Tele-Pos. 1 : 3	135	45	£ s. d. 14 5 0	Resonator	Landscapes and Large Portraits	Tele-Pos. 1 : 3	225	75	£ s. d. 34 0 0	Rubin	1*
2*	Tele-Pos. 1 : 3	135	58	15 5 0	Retina			225	100	36 10 0	Rubrik	2*
3	Anast. 1 : 8	205	58	16 10 0	Rosmarin	Landscapes and Architec- tural Views	"Protar," 1 : 8	350	100	35 0 0	Rumor	3
4	Anast. 1 : 8	196	75	15 5 0	Rosso			433	125	43 10 0	Rundung	4
5*	"Protar," 1 : 7	179	58	19 10 0	Rotator		"Protar," 1 : 8	497	125	35 10 0	Rune	5
6*	"Protar," 1 : 6.3	200	75	22 0 0	Rubens			337	100	44 0 0	Russe	6*
7*	"Protar," 1 : 7	216	75	23 15 0	Ruptura			364	125	51 15 0	Ruthene	7*

The Combinations marked with a * must not be imported into France commercially.

SERIES V.

Zeiss' "Protar," F:16



WIDE ANGLE AND COPYING LENS.

MANUFACTURED BY

ROSS, Ltd.,

Sole Licensees for the British Empire.

RATIO OF STOPS.

F/16, F/22, F/32, F/45, F/64.

THIS Doublet consists of four single lenses cemented to form two combinations. The field measures in the smaller numbers over 100° , in the larger ones about 90° . The first seven sizes are specially useful for interiors, or work in confined situations. The five larger sizes are specially intended for the reproduction of maps, plans, and drawings; they yield a perfectly flat and anastigmatic image, and are entirely free from distortion. These lenses are very moderate in price.

No.	Equivalent focus.		Size of plate covered with stop.		Revised Price with Iris Diaphragms.	Code Word.
	mm.	in.	F/16. Inches.	F/32. Inches.		
1	86	$3\frac{1}{2}$	$4\frac{1}{2} \times 3\frac{1}{2}$	5×4	£3 4 0	Labrador.
2	112	$4\frac{1}{2}$	5×4	$6\frac{1}{2} \times 4\frac{1}{2}$	3 4 0	Lagune.
3	141	$5\frac{1}{2}$	$6\frac{1}{2} \times 4\frac{1}{2}$	$8\frac{1}{2} \times 6\frac{1}{2}$	4 0 0	Lama.
4	182	$7\frac{1}{2}$	$8\frac{1}{2} \times 6\frac{1}{2}$	10×8	5 0 0	Lapsus.
5	212	$8\frac{1}{2}$	10×8	12×10	6 5 0	Lateran.
6	265	$10\frac{1}{2}$	12×10	13×11	7 15 0	Lava.
7	315	$12\frac{1}{2}$	13×11	15×12	9 5 0	Lawine.
Reproductions of charts at 85° .						
8	460	18	13×11	15×12	12 5 0	Legende.
9	632	$24\frac{1}{2}$	15×12	20×16	18 0 0	Legion.
10	947	$37\frac{1}{2}$	20×16	25×22	35 10 0	Leo.
11	1310	$51\frac{1}{2}$	25×22	34×27	60 10 0	Libelle.
12	1660	$65\frac{1}{2}$	34×27	43×35	100 10 0	Lictor.

The cost of pairing two Lenses for stereoscopic work is 8/.

The four smallest sizes cannot be fitted with Iris Diaphragms, and are kept in stock with Wheel Stops only. All other sizes are stocked with Iris only.

THE ABOVE PRICES ARE NET.

SOLD BY LEADING DEALERS EVERYWHERE.

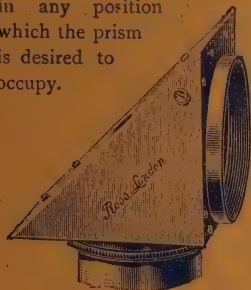
Reversing Prisms & Mirrors

For Photo-Mechanical Process Work, &c.

THESE Prisms are made of carefully annealed and colourless crown glass; they are accurately rectangular, and their hypotenuse surface is silvered to insure complete reflection.

The mount of the prism screws directly to the hood of the objective in such a manner as to bring one of the non-reflecting surfaces into close proximity of the front lens. By this arrangement the prism becomes fully utilised.

The prices of the prisms include an objective-ring fitted with revolving collar and clamp, which allows of the objective being turned about its axis and clamped in any position which the prism is desired to occupy.



PRICES OF PRISMS.			
No.	Length and breadth of Non-reflecting Surfaces.		PRICE. £ s. d.
	Ins.	mm.	
1	I	25	4 15 0
2	1 $\frac{3}{8}$	35	6 10 0
3	1 $\frac{7}{8}$	46	8 0 0
4	2 $\frac{3}{8}$	60	13 5 0
5	3	75	20 0 0
6	3 $\frac{1}{4}$	90	28 15 0
7	4 $\frac{1}{8}$	105	40 5 0
8	4 $\frac{7}{8}$	125	71 5 0

The above Prices are Net.

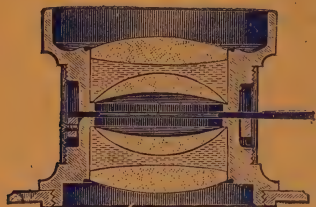
Prices of Mirrors, Worked Optically Plane & Silvered,

Including Mahogany Mirror Box.

Size.	6×4	7×5	8×6	10×8
SERIES A	£4 10 0	£5 0 0	£6 0 0	£7 10 0
„ B	3 0 0	3 10 0	4 0 0	5 0 0
Re-silvering ...	0 5 0	0 7 6	0 10 0	0 12 6

The above Prices are net.

The Double Anastigmat.



(GOERZ' PATENT.)

SERIES III

MANUFACTURED BY

ROSS, Limited.

Nos. 00 to 6, F 6·8

Nos. 7 to 11, F 7·7

These Lenses are universal in character and highly suitable for Landscapes, Instantaneous Work, Portraits, Groups, and Architecture. The Double Anastigmat permits the use of the largest stop without diminishing the sharpness of the image at the extreme margins of the plate up to an angle of 70° . By the use of a smaller stop an angle of over 80° is obtained. Definition, brilliancy, and flatness of field are uniform from the centre to the margin of the plate.

No.	Equiv. Focus.	Plate covered F 8.	Plate covered F 16.	Plate covered F 64.	Price with Iris Diaphragm.	Code Word.
	ins.	ins.	ins.	ins.	£ s. d.	
00	4	3×3	$4\frac{1}{4} \times 3\frac{1}{4}$	5×4	5 0 0	Sabre
0	5	$4\frac{1}{4} \times 3\frac{1}{4}$	5×4	$6\frac{1}{2} \times 4\frac{3}{4}$	5 5 0	Salem
1	6	5×4	$6\frac{1}{2} \times 4\frac{3}{4}$	8×5	6 5 0	Sappho
2	7	$6\frac{1}{2} \times 4\frac{3}{4}$	8×5	$8\frac{1}{2} \times 6\frac{1}{2}$	7 5 0	Sarepta
3	$8\frac{1}{4}$	8×5	$8\frac{1}{2} \times 6\frac{1}{2}$	9×7	8 15 0	Saxon
4	$9\frac{1}{2}$	$8\frac{1}{2} \times 6\frac{1}{2}$	9×7	10×8	10 10 0	Signet
5	$10\frac{1}{2}$	9×7	10×8	12×10	12 15 0	Sinbad
6	12	10×8	12×10	15×12	15 5 0	Sirius
7	14	12×10	15×12	18×16	19 15 0	Socrates
7A	$16\frac{1}{2}$	13×11	17×13	22×18	26 0 0	Sorcerer
8	19	15×12	18×16	22×18	31 0 0	Spartan
9	24	18×16	22×18	25×22	46 0 0	Sphinx
10	30	22×18	25×22	30×24	76 5 0	Spinster
11	35	25×22	30×24	36×28	151 5 0	Sprite

The plates indicated as covered with F 8, F 16, and F 64, are rather under the Continental sizes given in the Pat-ntee's list, and therefore the lenses may be advantageously used for the next larger sizes of plates under favourable conditions.

A charge of 10/- extra is made for pairing two lenses for stereoscopic work.

THE ABOVE PRICES ARE NET.

SOLD BY LEADING DEALERS EVERYWHERE.

THE DOUBLE ANASTIGMAT.

(GOERZ' PATENT.)

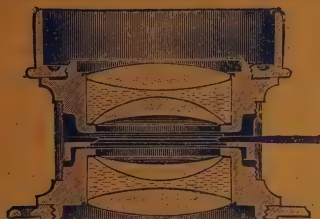
SERIES IV.

MANUFACTURED BY

ROSS, Limited.

F 11.

A WIDE-ANGLE AND PROCESS LENS.



This is a Wide-Angle Lens specially suitable for Copying, Enlarging, Architecture, Interiors, &c. The angle of clearly defined image, with the largest aperture, includes 75° , so that it may be employed for wide-angled instantaneous views and groups. With a smaller stop, it will define with uniform sharpness up to the margins of a plate whose diagonal is equal to twice the focus of the lens, thus including an angle of 90° .

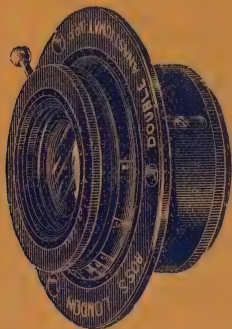
No.	Equiv. Focus.	For Repro- duction. <i>F16-F22.</i>	For En- larging. <i>F16-F22</i>	For Groups. <i>F 11.</i>	With Smaller Stops	Prices with Waterhouse Stops.	Prices with Iris.
	In.	Inches.	Inches.	Inches.	Inches.	£ s. d.	£ s. d.
6	12	18 × 16	12 × 10	12 × 10	18 × 16	15 10 0	16 5 0
7	14	22 × 18	15 × 12	15 × 12	22 × 18	20 0 0	20 15 0
8	19	25 × 22	18 × 16	18 × 16	25 × 22	32 10 0	33 5 0
9	24	30 × 24	22 × 18	22 × 18	30 × 24	48 15 0	49 15 0
10	30	36 × 28	25 × 22	25 × 22	36 × 28	80 0 0	81 0 0
11	35	44 × 34	30 × 24	30 × 24	44 × 34	155 0 0	156 0 0
12	47	60 × 40	36 × 28	36 × 28	60 × 40	280 0 0	281 5 0

The above Prices are Net.

SOLD BY LEADING DEALERS EVERYWHERE.

IMPORTANT NOTICE.—The Goerz Patent Double Anastigmat Lenses, manufactured (under licence) by Ross, Ltd., at their Optical Works, Clapham Common, are guaranteed to be exactly similar in optical properties and construction to those made by Mr. C. P. Goerz, in Germany, the only difference between the respective lenses being that the Ross-Goerz Anastigmats are mounted in the English style, the apertures in all cases corresponding to the Standard of the Royal Photographic Society.

FOR HAND CAMERAS.



THE ROSS-GOERZ' LENSES

ARE SUPPLIED

With Iris Diaphragms and
Focussing Jackets.

SERIES III.—F 7·7 & F 6·8.

THE smaller sizes of Series III., ROSS-GOERZ Double Anastigmats, are particularly well adapted for Hand Camera work; at full aperture they cover sharply up to the corners of a plate whose longest side is equal to the focus. To facilitate the adaptation of these Lenses to Hand or Detective Cameras which have no focussing adjustment, Ross, Limited, are now prepared to supply them to order, mounted in special settings, fitted with Iris diaphragms and a very convenient worm focussing screw, with scale marked off for various distances.

No.	Equiv. Focus.	Size of Plate Sharply Covered at			Code Word.	Price with Iris Diaphragm.
		f.7·7.	f.16.	f.64.		
	Ins.	Ins.	Ins.	Ins.		£ s. d.
0	5	$4\frac{1}{2} \times 3\frac{1}{4}$	5×4	$6\frac{1}{2} \times 4\frac{3}{4}$	Corso	6 0 0
1	6	5×4	$6\frac{1}{2} \times 4\frac{3}{4}$	8×5	Courant	7 5 0
2	7	$6\frac{1}{2} \times 4\frac{3}{4}$	8×5	9×7	Cuba	8 5 0

The cost of pairing two lenses for Stereoscopic Work is 10-

An extra charge will be made if special scales are required.

The above Prices are Net.

SOLD BY LEADING DEALERS EVERYWHERE.

TAKEN WITH

ROSS' NEW FOCAL-PLANE CAMERA.

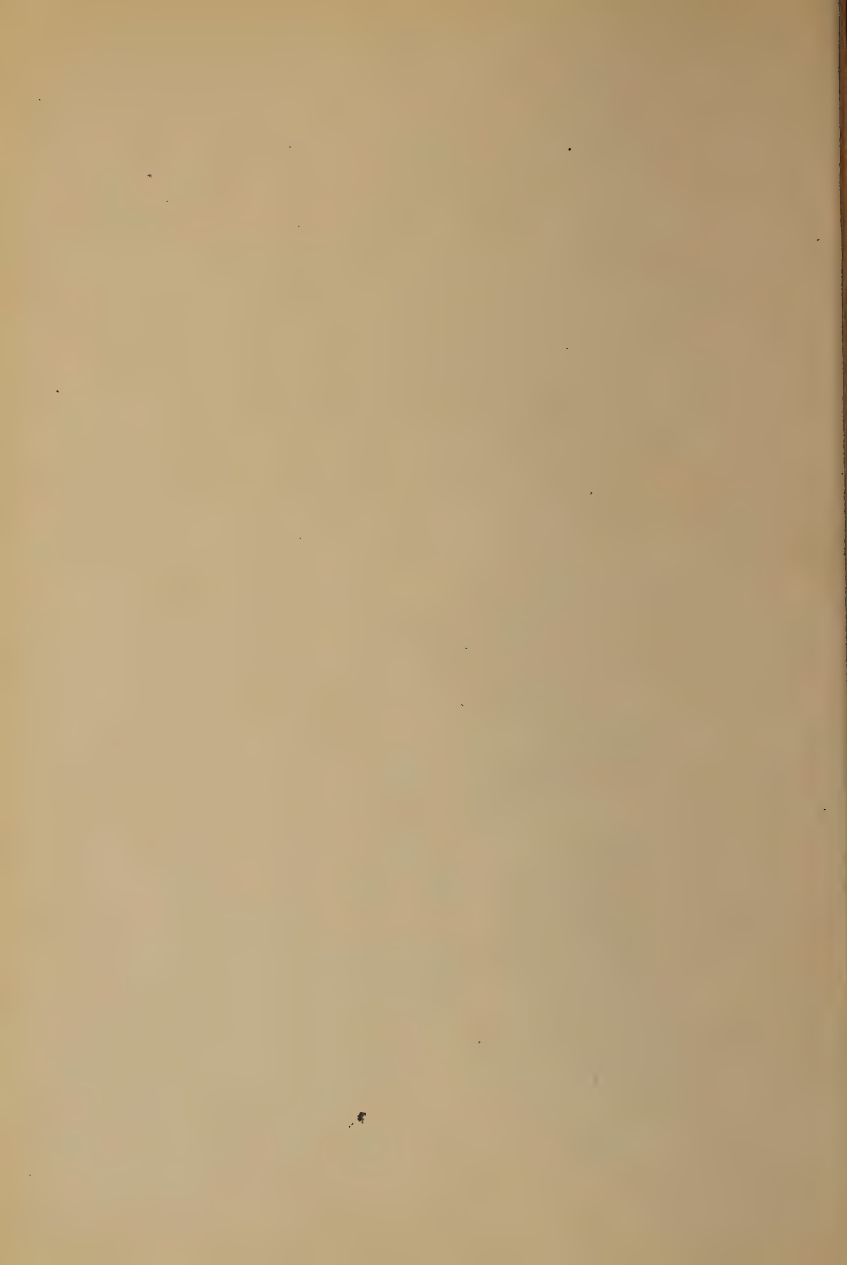


WATERLOO PLACE, LONDON.

Copyright.

FITTED WITH

ROSS' PATENT "HOMOCENTRIC" LENS.



The Sector Shutter.

(GOERZ' PATENT.)

THIS Shutter is formed by segments situated in the plane of the diaphragm, and opening from and closing towards the centre.

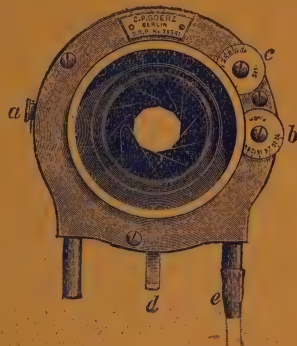
This Shutter not only combines the good qualities of the best systems of Shutters hitherto known, but surpasses them in many respects.

Its advantages are as follows :—

1. Simplicity of mechanism, hence permanently uniform and reliable action.

2. All moving parts are completely covered in, and are therefore not susceptible to disturbing external influences, such as concussion, dust, moisture, &c.

3. It can be fitted between lens systems which have very little separation from each other (*e.g.*, double anastigmats with short focus), as the segments are one-tenth of a millimetre only in thickness.



SMALL MODEL, suitable for the Double Anastigmats Nos. 0 to 3, or any Lens with an aperture not exceeding $\frac{15}{16}$ in.

Price £3 10 0 net.

LARGER MODEL, suitable for the Double Anastigmats Nos. 4 to 6, or any Lens with an aperture not exceeding $1\frac{1}{2}$ in.

Price £4 10 0 net.

THE ABOVE PRICES ARE NET.

Cost of fitting, 6/- to 15/- each, according to size.

The original Lens Tube is not altered, and will be returned.

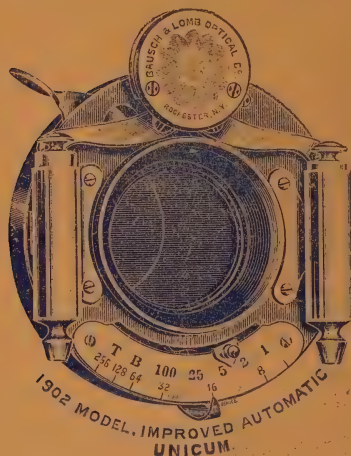
No charge will be made for fitting if the Shutter is ordered from Ross Limited, *simultaneously with a Lens manufactured by them.*

The Automat Shutter.

THE Automat is, as its name implies, a strictly automatic shutter.

It is always set ready for exposure and is released by simple pressure of the pneumatic bulb or finger release. It gives exposures

from one second to about $\frac{1}{100}$ second and may in addition be set so that time exposures of any duration may be made as well as "bulb exposures," in which case pressing the pneumatic bulb opens the blades and they remain open as long as the pressure is applied. The various speeds are secured by moving the pointer along the scale. The speeds are controlled by a patent pneumatic retarding device.



AUTOMAT.

An Iris diaphragm operated by lever at the lower edge gives any size stop, the stop values being read off on the graduated scale. This scale is graduated especially for the particular Lens used with the shutter.

The Automat is very compact and neat in appearance. The working parts are nearly all inclosed within the case, preventing injury from dust or accident.

This type of shutter was only recently introduced, and sprang into instant popularity both with camera makers and the public. It is thoroughly practical and up-to-date.

PRICES.

Telegraphic Code.	No.	Will take Lenses with opening of	Price fitted to Lenses of Our Manufacture.	Price fitted to Lenses of Other Manufacturers.
			£ s. d.	£ s. d.
<i>Autom</i>	1	23 mm.	1 8 0	1 15 6
<i>Autara</i>	2	30 mm.	2 5 0	2 12 6
<i>Autexil</i>	3	40 mm.	2 17 6	3 7 6

FIVE PER CENT. DISCOUNT FOR CASH.

B. & L. IRIS SHUTTER.



THE "UNICUM."

THIS Shutter has pneumatic and finger release, and instantaneous exposures of various speeds can be given by turning a dial. Time exposures can be given by retaining the pressure on the ball or finger release at will; while to obtain lengthened exposures for interiors it may be set to remain open for any period.

Prices, in Brass, with Speed Indicator.

$4\frac{1}{4} \times 3\frac{1}{4}$ and 5×4	£1 7 6 each.
$6\frac{1}{2} \times 4\frac{1}{2}$ and $7\frac{1}{2} \times 5$	£1 17 6 „
$8\frac{1}{2} \times 6\frac{1}{2}$	£2 12 6 „

A small Extra Charge is made for Adaptation to Lenses according to the time required.

THORNTON-PICKARD PATENT

“IRIS” SHUTTER.

A Between-Lens Shutter

made entirely of Metal.

SMALL, COMPACT, AND EFFICIENT.

All moving parts carefully adjusted and accurately balanced. Works smoothly without vibration. Speeds from $\frac{1}{100}$ of a second to 1 second.

Time Exposures of any Duration,

Price 25s. $\frac{1}{4}$ -plate and 5 in. \times 4 in.



FIVE PER CENT. DISCOUNT FOR CASH.

PATENT Time & Instantaneous



Standard
Pattern

Shutter.

*To fit on either the Hood or Tube of Lens.
Particulars of the smallest size:*

Price 14/6.

SPEED up to $\frac{1}{50}$ of a second.

DIMENSIONS, $3\frac{1}{4} \times 3 \times \frac{1}{4}$ inches.

WEIGHT, $3\frac{1}{2}$ ozs.

Speed Indicator included.

CHEAPER PATTERN MADE
IN ALUMINIUM,

Price from 12/6.

SIZE, to fit on a Lens Hood or Tube up to Ins. diam.—	1½	1¾	2	2½	3	3½
TIME AND INSTANTANEOUS. STANDARD PATTERN	14/6	15/-	16/-	18/-	21/-	25/-
Do. do. BEHIND LENS	15/6	16/-	17/6	19/6	22/6	26/6
Do. do. ALUMINIUM PATTERN ...	12/6	13/6	15/6	18/-	—	—
Do. do. ALUMINIUM BEHIND LENS	13/6	14/6	16/6	19/-	—	—
<i>If fitted with cord release instead of ball and tube for Hand Cameras, 1/- less.</i>						
EXTRA RAPID AND FOREGROUND.						
TIME AND INSTANTANEOUS	—	23/6	25/6	28/6	32/6	37/6
STEREOSCOPIC.						
TIME AND INSTANTANEOUS, at 3 in. or 3½ in. centres	20/-	21/-	23/-	27/-	—	—
Do. do. BEHIND LENS do.	22/6	23/6	25/6	29/6	—	—
<i>3½ in. centres, 2/- extra; 3¾ in. centres, 4/- extra. ADJUSTABLE PANEL FOR BEHIND LENS, extra 7/6</i>						
SNAP SHOT, for Instantaneous only.						
Standard Pattern	10/-	10/-	12/-	15/-	20/6	—
Aluminium do.	9/-	9/-	10/6	13/6	—	—
SPECIAL, for more Rapid Instantaneous ...	—	23/6	25/6	28/6	32/6	37/6
SILENT STUDIO	—	—	20/6	23/6	27/6	32/6
FOCAL PLANE. ½-Plate 5×4 ½-Plate 7½×5 ½-Plate 10×8 12×10	£1 15 0	£2 0 0	£2 5 0	£2 12 6	£3 0 0	£3 10 0

ROSS' "Century" Camera.

An Instrument of the highest quality and finish,
in which the advantages of the "Square" and
"Tourist" Pattern Cameras are combined.

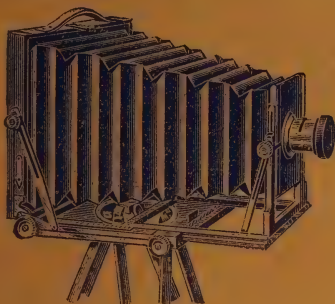


Fig. 1.

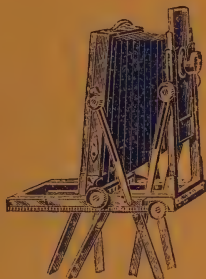


Fig. 2.

THIS Camera has been specially designed to meet the requirements of the modern Anastigmatic Lenses.

The chief advantages of the "Century" Camera are :—

- 1st.—Its Lightness and Portability.
- 2nd.—Its Extensive Rising Front.
- 3rd.—Its Double Rack Focussing.

DESCRIPTION.

Expert users of modern high-class Lenses have hitherto found that the old-fashioned square bellows cameras, notwithstanding their weight, possessed some points of advantage over the lighter and more popular tourist patterns. The defects of the usual conical bellows cameras are especially noticeable when photographing architectural subjects with wide-angle lenses, or copying.

ROSS' "CENTURY" CAMERA

(CONTINUED).

In the former case the bellows is forced backwards in front of the plate when the lens is raised, and unless great care is taken a portion of the picture is lost. When copying, it is a great advantage to have the lens fixed and to focus from the back, but with most portable cameras the contrary is the case.

The "Century" Camera has been introduced because it is entirely free from the defects enumerated above, and combines, in a most perfect manner, the advantages of both systems.

The "Century" Camera is made of the finest selected and seasoned Spanish mahogany, and can be recommended for any climate. Although it is very light, the lightness has not been

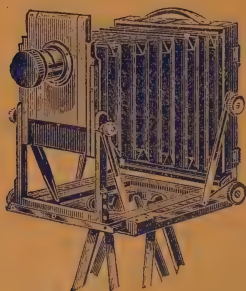


Fig. 3.



Fig. 4.

secured by weakening any part of the instrument, but by eliminating wood and brass from places where it served no useful purpose. Great care has been taken to make the camera as rigid as possible, and in all cases where there are metal parts it will be found that these work on metal and not on wood. The various screws are kept in position with locking screws, and therefore there is no danger of their working loose and getting lost.

THE RISING FRONT.—It will be noticed from the illustrations (Figs. 2 and 3) that the rising front of the Ross "Century" Camera differs materially from that in the usual conical bellows pattern. The bellows has been designed with the greatest possible depth in front, and this bellows front may be raised or lowered in the side-supporting arms as in most portable cameras, but to a far greater extent, because, by our method of construction,

ROSS' "CENTURY" CAMERA

(CONTINUED).

the top bar which usually connects these side arms is dispensed with. A notable improvement also lies in the fact that the lens may be raised quite independently of the bellows front. This movement is shown in Figs. 2 and 3.

THE FOCUSING.—The "Century" Camera has double focussing racks, one screw actuating the front and the other the back of the instrument. The value of having these two racks will be manifest to those who wish to use the instrument as a Hand Camera or for copying purposes. When used as a Hand Camera the focussing is usually done by means of the back rack, and after racking to any desired position the rack may be clamped with a locking screw. In copying, the front is first racked out considerably, and the focussing performed by means of the back screw, thus obviating the difficulty of a greatly varying size of image, which takes place when the lens itself is moved to or from the subject.

GENERAL INFORMATION.

The "Century" Camera has, in addition to the great rise on the front, a swing motion to the front, also swing back. The dark slides are made in the best possible manner, and have special light-tight hinges, rendering them safe in all climates.

The Camera may be had either with or without turntable, but the former is strongly recommended, for the turntable makes the camera far more rigid and permits of its being rotated into any position and then firmly clamped.

PRICES.

The following prices include camera, three double dark slides, best quality three-fold tripod, and revolving turntable complete.

Size in inches.	Prices.	Extra double Dark Slides.	Brass Binding extra.	Size of Camera closed.	Extends
$6\frac{1}{2} \times 4\frac{3}{4}$	£11 10 0	£1 2 0	£1 10 0	$8\frac{1}{2} \times 8\frac{1}{2} \times 2$	14 inches
$7\frac{1}{2} \times 5$	12 10 0	1 2 0	1 10 0	$9\frac{1}{2} \times 9\frac{1}{2} \times 2$	17 "
$8\frac{1}{2} \times 6\frac{1}{2}$	14 0 0	1 5 0	1 15 0	$11 \times 10\frac{3}{4} \times 2\frac{1}{2}$	19 $\frac{3}{4}$ "
10×8	16 0 0	1 12 0	2 0 0	$12\frac{1}{2} \times 12\frac{1}{2} \times 3$	21 "
12×10	19 0 0	2 0 0	2 10 0	$14\frac{1}{2} \times 14\frac{1}{2} \times 3$	26 "
15×12	24 0 0	2 15 0	3 0 0	$17\frac{1}{2} \times 17\frac{1}{2} \times 3\frac{1}{2}$	33 "
18×16	35 0 0	3 10 0	4 0 0	$21 \times 21 \times 3\frac{1}{2}$	40 "

Five per cent. discount for cash with order.

For 12×10 , and larger sizes, a light supplementary leg for the front of camera is recommended. The price of this, including camera fittings, is 10/6.

ROSS'

IMPROVED CAMERAS.

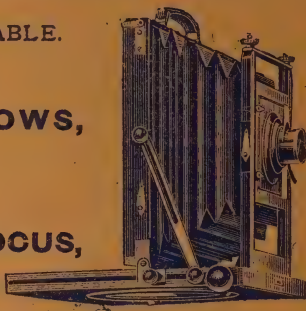
EXTRA LIGHT AND PORTABLE.

WITH DOUBLE
EXTENSION BELLOWS,

... FOR ...

LENSES OF LONG
OR SHORT FOCUS,

With all desirable movements.



PATTERN No. 1.

THIS is an extremely portable Camera, combining stability and rigidity with all movements required in a really useful and reliable apparatus. The ground glass screen may be moved close up to the front, rendering the camera particularly suitable for wide-angle lenses, and thus obviating any cutting off of the foreground of the picture by the baseboard. The Cameras can be supplied with Turntables or plain baseboards as may be required.

PRICES OF PATTERN No. 1.

Size.	With One Double Back.	With Three Double Backs.	Turntable and Stand.	Brass Binding Camera and Three Backs.
	£ s. d.	£ s. d.	£ s. d.	£ s. d.
6½ × 4½	6 10 0	8 14 0	1 17 6	1 10 0
7½ × 5	7 10 0	9 14 0	1 17 6	1 10 0
8½ × 6½	8 0 0	10 10 0	1 17 6	1 15 0
10 × 8	9 0 0	12 4 0	2 0 0	2 0 0
12 × 10	11 10 0	15 10 0	2 5 0	2 10 0
15 × 12	14 10 0	20 0 0	2 10 0	3 0 0
18 × 16	22 0 0	29 10 0	2 15 0	4 0 0

Extra Charge for Complete Aluminium Fittings, including Turntable.

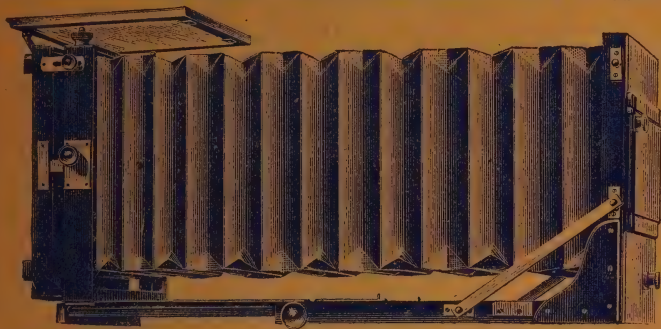
7½ × 5	8½ × 6½	10 × 8	12 × 10	15 × 12	18 × 16
£3	£3 10s.	£4	£5	£6	£7 10s.

Five per cent. Discount for Cash.

ROSS' Improved Portable Square Bellows Cameras.

DOUBLE EXTENSION WITH REVERSIBLE HOLDERS.

For Lenses of Long Focus. The $7\frac{1}{2} \times 5$ size extends from 3 to $17\frac{1}{2}$ in.



THIS pattern is a favourite with Professional Photographers and Process Workers, and also for Railway, Shipyard, and Engineering Photographic Work.

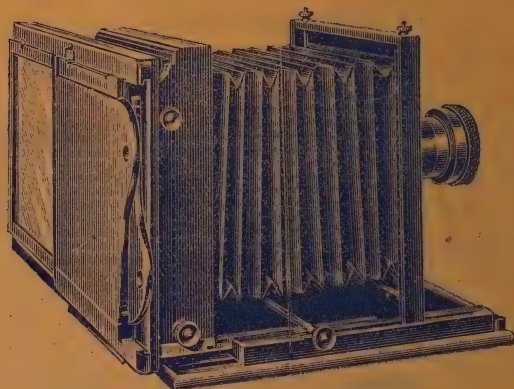
The Front is rigid, and therefore well adapted for carrying long focus heavy lenses, and, as the bellows racks backwards, wide-angle lenses may be employed without having the foreground of the picture cut off by the baseboard, as frequently happens with Cameras of other patterns. The baseboard folds over the ground-glass screen when closed, thus protecting it from danger of breakage.

Size.	Price of Camera only.	Brass binding extra.	Double Dark Slides. Each.	Brass Binding Dark Slides. Each.	Rack & Pinion to double Swing Back.
5 × 4 ...	£6 0 0	... £0 15 0	... £0 18 0	... £0 5 0	... £0 10 0
6½ × 4½ ...	7 5 0	... 0 15 0	... 1 2 0	... 0 5 0	... 0 10 0
7½ × 5 ...	7 10 0	... 0 15 0	... 1 2 0	... 0 5 0	... 0 10 0
8½ × 6½ ...	9 10 0	... 0 15 0	... 1 5 0	... 0 5 0	... 0 10 0
10 × 8 ...	10 0 0	... 1 0 0	... 1 12 0	... 0 6 0	... 0 15 0
12 × 10 ...	11 10 0	... 1 10 0	... 2 0 0	... 0 6 0	... 0 15 0
15 × 12 ...	13 10 0	... 1 15 0	... 2 15 0	... 0 7 6	... 1 0 0
18 × 16 ...	22 0 0	... 2 10 0	... 3 10 0	... 0 10 0	... 1 0 0

Divisions for Stereoscopic Views are supplied with the $8\frac{1}{2} \times 6\frac{1}{2}$ and all smaller sizes, and with the larger Cameras (at an extra charge) when desired. The prices of Cameras include two fronts or lens boards.

FIVE PER CENT. DISCOUNT FOR CASH.

ROSS' IMPROVED Studio Cameras.



IMPROVED UNIVERSAL STUDIO CAMERAS:

FOR LENSES OF LONG FOCUS, WITH REPEATING BACK AND INNER FRAMES.

Size.		Size.	With Single Swing Back.	With Double Swing Back.	Brass Binding.
6 $\frac{1}{2}$ × 6 $\frac{1}{2}$	for Plates	6 $\frac{1}{2}$ × 4 $\frac{1}{2}$ and under	£6 0 0	£7 0 0	£1 5 0
8 $\frac{1}{2}$ × 8 $\frac{1}{2}$	"	8 $\frac{1}{2}$ × 6 $\frac{1}{2}$	7 5 0	8 5 0	1 5 0
9 × 9	"	9 × 7	7 15 0	8 15 0	1 5 0
10 × 10	"	10 × 8	8 15 0	9 15 0	1 10 0
12 × 12	"	12 × 10	10 10 0	11 15 0	2 5 0
15 × 15	"	15 × 12	15 10 0	17 10 0	2 15 0

Rack Adjustment to Swing Back, from 10s. extra for each Rack.

CAMERA STANDS.

LIGHT TRIPOD STANDS from £0 12 6

ASH TRIPOD STAND,	triangle top	...	...	...	1 1 0
"	(Kennett's pattern), small, medium, or large...	...	...	...	1 6 0
"	threefold or fourfold	...	...	...	1 6 0
"	with brass turntable	...	...	...	1 17 6
"	8-in. brass triangle top, rigid legs	...	...	...	1 8 0
"	8-in. stouter	...	...	...	1 10 6
"	6-in. with jointed legs	...	...	...	1 4 0
"	8-in.	...	...	...	1 12 0

TABLE STAND FOR THE STUDIO,	in oak, French polished	...	1 10 0
"	in white wood	...	1 4 0
"	with rack adjustment	...	3 16 0
"	in oak or mahogany	...	5 10 0
"	Large, in oak, rack adjustment	...	8 10 0
"	with heavy triangular base	...	12 12 0

FIVE PER CENT. DISCOUNT FOR CASH.

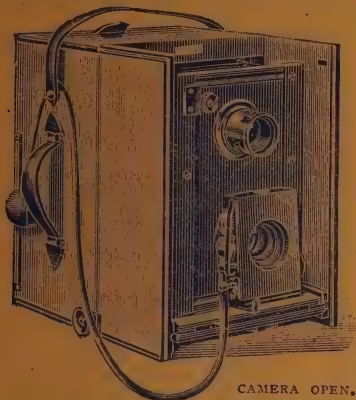
ROSS' NEW MODEL

Twin Lens Camera.

(PATENT).

THE great popularity of the Twin-Lens Camera has created a demand for Cameras to take plates of larger sizes than those formerly listed. To meet this want, and for the convenience of many

Lady Photographers, and others who prefer to make a medium size picture, ROSS, Ltd., have devised and patented a



CAMERA OPEN.

NEW FOLDING TWIN-LENS CAMERA

of even less weight, and which, when closed, is only two-thirds the size of the original model.

This important improvement has been achieved by discarding the hinged front door and portions of the top and base of the body, and thus decreasing the weight, and utilising the front portions of the two sides to form folding doors (as shown in the illustration). The lower portion of the inside of these doors have grooved fittings, which form guides for the travelling frame, and thus render this new form,

when ready for use, absolutely rigid. When closed, the doors are fastened by a spring clip.

To set up the apparatus it is only necessary to press this spring and rack out the front, when the doors open automatically and the travelling frame runs into position. The front is then pulled forward and clamped by the curved lever.

This camera is used in precisely the same manner as the original model, being suspended from the neck by a sling, or mounted upon a stand, as desired.

THE FOLLOWING IMPORTANT ADVANTAGES ARE CLAIMED FOR THIS CAMERA:—

- 1st.—Each picture can be obtained with microscopic sharpness.
- 2nd.—The composition and lighting of instantaneous pictures can be studied.
- 3rd.—In photographing yachts and other large subjects, there is an absolute certainty of the whole of the objects being correctly centred, and contained within the limits of the plate.
- 4th.—When used as an ordinary camera on a tripod stand for obtaining portraits of children and animals, the many out-of-focus failures (due to the subject moving during the comparatively long interval that must elapse after focussing before the plate can be substituted for the screen) are by this system entirely avoided.

Prices of Twin

**Including Two Lenses, accurately paired, Blind Shutter,
Box for Twelve Glass**

WITH PAIR ROSS RAPID HAND CAMERA LENSES, F 8.

For Plates.		Focus of Lenses.	Rigid Model.			Folding Model.		
Inches.	c/m	Inches.	£	s.	d.	£	s.	d.
$3\frac{1}{4} \times 3\frac{1}{4}$	—	$4\frac{1}{2}$	15	0	0	—	—	—
$4\frac{1}{4} \times 3\frac{1}{4}$	6 × 8	5	16	0	0	18	0	0
5×4	9 × 12	6	18	0	0	20	0	0
$6\frac{1}{2} \times 4\frac{3}{4}$	12 × $16\frac{1}{2}$	8	20	10	0	23	0	0
$7\frac{1}{2} \times 5$	13 × 18	9	—	—	—	27	0	0
$8\frac{1}{2} \times 6\frac{1}{2}$	18 × 22	12	—	—	—	35	0	0

WITH PAIR ROSS-ZEISS SERIES IIIA. ANASTIGMATIC
LENSES, F 8.

Inches.	c/m	Inches.	Rigid.			Folding.		
Inches.	c/m	Inches.	£	s.	d.	£	s.	d.
$4\frac{1}{4} \times 3\frac{1}{4}$	6 × 8	6	16	10	0	18	10	0
5×4	9 × 12	$6\frac{3}{4}$	20	0	0	22	0	0
$6\frac{1}{2} \times 4\frac{3}{4}$	12 × $16\frac{1}{2}$	$7\frac{1}{4}$	22	0	0	24	10	0
$7\frac{1}{2} \times 5$	13 × 18	$7\frac{3}{4}$	—	—	—	26	10	0
$8\frac{1}{2} \times 6\frac{1}{2}$	18 × 22	$9\frac{1}{4}$	—	—	—	34	0	0

WITH PAIR ROSS-GOERZ SERIES III. DOUBLE
ANASTIGMATIC LENSES, F 7.7.

Inches.	c/m	Inches.	Rigid.			Folding.		
Inches.	c/m	Inches.	£	s.	d.	£	s.	d.
$4\frac{1}{4} \times 3\frac{1}{4}$	6 × 8	5	20	10	0	22	10	0
5×4	9 × 12	6	23	10	0	25	10	0
$6\frac{1}{2} \times 4\frac{3}{4}$	12 × $16\frac{1}{2}$	7	26	0	0	28	10	0
$7\frac{1}{2} \times 5$	13 × 18	$8\frac{1}{4}$	—	—	—	34	0	0
$8\frac{1}{2} \times 6\frac{1}{2}$	18 × 22	$9\frac{1}{2}$	—	—	—	42	0	0

THE ABOVE PRICES

Lens Cameras,

and either Three Double Dark Slides, or a Changing Plates or Twenty Films.

WITH PAIR ROSS EXTRA-RAPID HAND CAMERA
LENSES, F 5.6.

For Plates.		Focus of Lenses.	Rigid Model.	Folding Model.
Inches.	c/m.	Inches.	£ s. d.	£ s. d.
$3\frac{1}{4} \times 3\frac{1}{4}$	—	$4\frac{1}{4}$	17 0 0	—
$4\frac{1}{4} \times 3\frac{1}{4}$	6 × 8	6	19 0 0	21 0 0
5 × 4	9 × 12	$7\frac{1}{2}$	24 0 0	26 0 0
$6\frac{1}{4} \times 4\frac{3}{4}$	12 × 16½	9	25 10 0	28 0 0
$7\frac{1}{2} \times 5$	13 × 18	$10\frac{1}{2}$	—	34 0 0
$8\frac{1}{2} \times 6\frac{1}{2}$	18 × 22	12	—	43 10 0

Any other suitable Lenses or Shutters may be Substituted at the difference in Catalogue Prices.

EXTRA DOUBLE DARK SLIDES.

$4\frac{1}{4} \times 3\frac{1}{4}$	5 × 4	$6\frac{1}{2} \times 4\frac{3}{4}$	$8\frac{1}{2} \times 6\frac{1}{2}$
15s.	18s.	£1 2s.	£1 5s. each.

EXTRA CHANGING BOXES.

$4\frac{1}{4} \times 3\frac{1}{4}$	5 × 4	$6\frac{1}{2} \times 4\frac{3}{4}$	$8\frac{1}{2} \times 6\frac{1}{2}$
£2 5s.	£2 12s.	£2 15s.	£3 5s.

INNER FRAMES.

Outside Sizes of Frames.

5 × 4	½-plate	$7\frac{1}{2} \times 5$	⅓-plate
1s. 9d.	1s. 9d.	2s.	2s. 6d

EXTRAS.

Double Swing Back Attachment, polished black, $4\frac{1}{4} \times 3\frac{1}{4}$, 25/-; 5 × 4, 30/-; $6\frac{1}{2} \times 4\frac{3}{4}$, 35/-; $7\frac{1}{2} \times 5$, 40/-

Focussing Hoods, to exclude sunlight from finder, 6/6. Special new form, 12/6.

Brass Binding Camera and Double Dark Slides, $4\frac{1}{4} \times 3\frac{1}{4}$, 20/-; 5 × 4, 25/-;

$6\frac{1}{2} \times 4\frac{3}{4}$, 30/-; $7\frac{1}{2} \times 5$, 30/-

ARE NET.

A New Plate or Film CHANGING BOX.

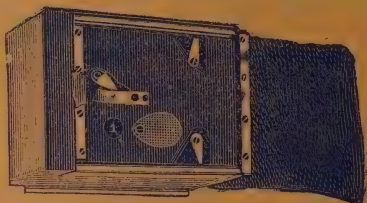
(Grundmann's Patent.)



THIS Patent CHANGING BOX serves

both as a magazine and dark slide, no extra slide being necessary.

It is capable of holding twelve dry plates or twenty cut films at one time, and all the exposures may be made in turn without refilling the Changing Box. It will work equally well with either the full complement, or with any lesser number, down to a single dry plate or film.



PRICES.

CHANGING BOXES, provided with an arrangement for widening or narrowing the slots through which the carriers pass, adapting them to work with Dry Plates or Films. Well-seasoned mahogany, brass bound. Including twelve Aluminium Plate Sheaths.

Inches...	$4\frac{1}{4} \times 3\frac{1}{4}$	5×4	$6\frac{1}{2} \times 4\frac{3}{4}$	$8\frac{1}{2} \times 6\frac{1}{2}$	Stereoscopic.
Price ...	£2 5 0	£2 12 0	£2 15 0	£3 5 0	£2 10 0

They can be fitted to any ordinary Bellows Camera and to most Hand Cameras.

THIN EXTRA CARRIERS FOR FILMS ONLY—

Inches ...	$4\frac{1}{4} \times 3\frac{1}{4}$	5×4	$6\frac{1}{2} \times 4\frac{3}{4}$	Stereoscopic.
Aluminium, each ...	1/3	1/6	2/-	2/-

FIVE PER CENT. DISCOUNT FOR CASH.

CAMERA CASES.

Waterproof Sling	4½ × 3¼	6½ × 4¾	7½ × 5	8½ × 6½	10 × 8	12 × 10
Canvas Cases,						
limp	£0 6 0..0	8 6..0	10 0..0	11 0..0	14 0..0	17 6
Best quality Canvas,						
stiff	0 15 0..1	0 0..1	1 0..1	3 6..1	5 6..1	10 0
Solid Leather, with						
lock	1 6 0..1	17 6..2	2 0..2	4 0..2	10 0..3	10 0

FOCUSSING CLOTHS.

Velvet, 5/- ; Fine Rubber, 5/- up to ½-plate ; larger, 8/6.

**EXTRA DOUBLE SLIDES FOR DRY
PLATE CAMERAS.**

Size.	Highest Finish.	Brass Binding.
4½ × 3¼	£0 15 0	£0 4 0 extra.
5 × 4	0 18 0	0 4 0 "
6½ × 4¾	1 2 0	0 4 0 "
7½ × 5	1 2 0	0 4 0 "
8½ × 6½	1 5 0	0 4 6 "
10 × 8	1 12 0	0 5 0 "
12 × 10	2 0 0	0 5 6 "
15 × 12	2 15 0	0 6 0 "
18 × 16	3 10 0	0 7 6 "

INNER FRAMES.

Outside sizes of Frames.

5×4	½-plate	7½×5	¾-plate	10×8	12×10	15×12	18×16							
1/9	...	1/9	...	2/-	...	2/6	...	3/-	...	3/6	...	5/-	...	6/-

CARTRIDGE ROLL-HOLDERS,

FOR DAYLIGHT LOADING.

Developing and Printing Outfits and Accessories of every description.

Hand and Stand CAMERAS

"ALPHA,"	"MIRAL,"
"AMBER,"	"NATTI,"
"ANSCHUTZ,"	"N. & G."
"CHALLENGE,"	"NYDIA,"
"DE-LUXE,"	"PREMO,"
"ECLIPSE,"	"REFLEX,"
"FRAM,"	"RUBY,"
"FOCAL-PLANE,"	"SANDERSON,"
"INFALLIBLE,"	"TELLA,"
"ILEX,"	"XIT,"

And other Cameras by

ALL LEADING MAKERS,

supplied fitted with the celebrated

ROSS, ZEISS, or GOERZ LENSES

OF FINEST ENGLISH MANUFACTURE.

A SPECIAL PRICE LIST OF ABOVE SENT ON APPLICATION.

For adaptation to Old or New Cameras,

ROSS, Ltd.,

can offer to

AMATEUR OR PROFESSIONAL PHOTOGRAPHERS AND PROCESS
WORKERS

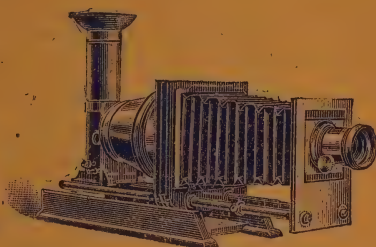
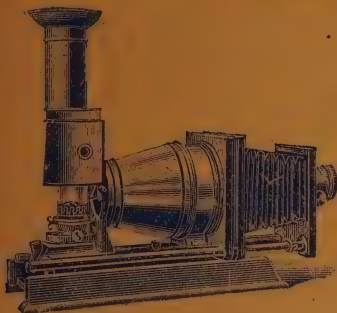
A Greater Choice and Finer Selection

of High-class Lenses than any other Manufacturer in the world.

ROSS'

NEW SERIES

Enlarging Lanterns.



THIS APPARATUS has been supplied to very many distinguished people, both in this country and abroad, and has had a large sale amongst both Professional and Amateur Photographers.

With the various improvements that have been added since its introduction, combined with beautiful workmanship, it has gained a reputation in the Trade as being the **BEST VALUE** and the **FINEST APPARATUS** of its kind at present on the market.

Each instrument is fitted with Ross' Patent Rising Body, and any form of light can be adapted and readily adjusted.

No.	Diameter of Condenser.		Negative fully covered.		PRICES without Objective, but including good Oil Lamp.
	Inches.	m/m	Inches.	c/m	
1	6½	163	5 × 4	9 × 12	£8 10 0
2	7	177	5½ × 4½	—	9 10 0
3	8	203	6½ × 4½	12 × 16	10 10 0
4	9	228	7 × 5	13 × 18	14 0 0
5	10	253	8 × 5	—	17 10 0
6	11	279	8½ × 6½	—	22 10 0
7	13	330	10 × 8	21 × 26	40 0 0
8	16	460	12 × 10	—	80 0 0

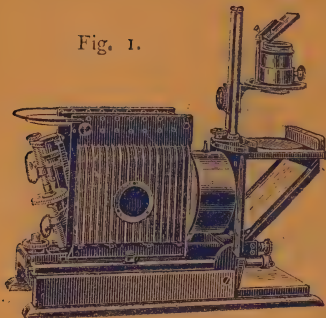
THE ABOVE PRICES ARE NET.

SOLD BY LEADING DEALERS EVERYWHERE.

ROSS' NEW UNIVERSAL

"Combination" Lantern

Fig. 1.



FOR
PROJECTION,
SCIENCE WORK,
OR
ENLARGING.

THIS is an extremely fine instrument, and will be found of great service in colleges and institutions where a great variety of work is performed. Whether used for Science Demonstration, for ordinary Projection or Enlarging, it will be found a most satisfactory apparatus.

The body is constructed of stout black brass plates, with an outer shell or body of aluminium, and the ventilation thus obtained is very perfect and admirably adapted for powerful illuminants, as there is nothing whatever to warp or get on fire with the intense heat.

A body thus made of aluminium is both serviceable and at the same time really good in appearance. Ross, Limited, were the originators of the ribbed aluminium lantern body.

Illustration (Fig. 1) shows the instrument as arranged for vertical projection, and this can be lowered in a moment for ordinary projection, or removed altogether, and another front with bellows to exclude the light substituted.

The instrument is supplied with a $4\frac{1}{2}$ -inch Triple Condenser, also a Double Condenser of $5\frac{1}{2}$ -inch diameter; a fine Objective for Projection, and Block Front, on which can be mounted any suitable Photographic Lens for Enlarging.

Complete with Two Condensers, Objective, best quality Jet, Vertical Attachment, and strong Wooden Case with lock and key, £24. If fitted with patent "Radiant" Jet, £3 extra. With Ross' Arc Lamp, £4 extra.

SOLD BY LEADING DEALERS EVERYWHERE.

ROSS' NEW UNIVERSAL Combination Lantern.

ANOTHER form of the Combination Lantern, as illustrated in Fig. 2, is supplied without vertical attachment, and with Patent Lime-light Body instead of the special brass and aluminium pattern. An important feature of this Lantern is the novel and comparatively small body or head inclosing the illuminant and carrying the chimney. This is fitted with sight holes, but no doors. The metal body can, by a patent arrangement, be raised several inches from its base, disclosing that portion of the jet which carries the lime, and leaving it entirely free for fixing. When this is done, the body can with equal facility be lowered into its original position. The jet taps and lime turner are placed outside this rising body, and the ventilation of the instrument is very thorough, both the direct and radiated heat being carried off thoroughly, no part of the apparatus being liable to undue heating.

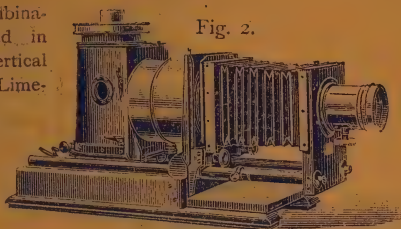


Fig. 2.

THE FOLLOWING ARE SOME OF THE USES TO WHICH THIS
LANTERN MAY BE PUT:—

PROJECTION OF LANTERN SLIDES.

PROJECTION OF $\frac{1}{4}$ -PLATE TRANSPARENCIES.

ENLARGING FROM $\frac{1}{4}$ -PLATE.

ENLARGING FROM LANTERN PLATES.

ENLARGING FROM PORTIONS OF LARGE PLATES.

PROJECTION OF $4\frac{1}{2}$ -INCH PARALLEL BEAMS.

PROJECTION OF $5\frac{1}{2}$ -INCH PARALLEL BEAMS.

THE ILLUMINATION OF TABLEUX, Etc.

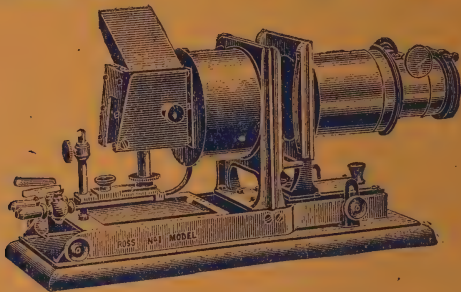
GENERAL SCIENCE WORK.

PRICE, complete with the two Condensers and Objective (better than the usual
"best quality" commercial objective), good jet, neat case, £15 10s.

SOLD BY LEADING DEALERS EVERYWHERE.

ROSS' = NEW =

Limelight Lantern.



No. 1 MODEL.

THE construction of this Lantern was mainly suggested by the ordinary Table Lamp. In such a Lamp certain portions are very hot, but we easily avoid them when it becomes necessary to adjust the light. In a similar manner this Lantern can be worked with ease and convenience, and with no more danger from heat than the Table Lamp, and there is actually less heating in the other portions of the Lantern than in instruments constructed with bodies of the usual pattern. The Condenser, for instance, does not get nearly so hot as is usually the case.

Every part is exceedingly rigid and substantial, and this makes the working of it a positive pleasure.

Any thickness of slide or carrier can be used, from two or three inches down to the thinness of paper.

Two of these Lanterns, placed one over the other, form a most efficient Biunial, but the Jets in this case must be fitted with "cut-off" taps, with a few simple parts to connect the Lanterns together.

The Lenses are excellent, and taken altogether, it may be said that a more convenient Lime-light Lantern for all ordinary purposes could not possibly be constructed.

Price complete, with Objective and "Blow through" or "Mixed Jet,"

£7 10 0

SOLD BY LEADING DEALERS EVERYWHERE.

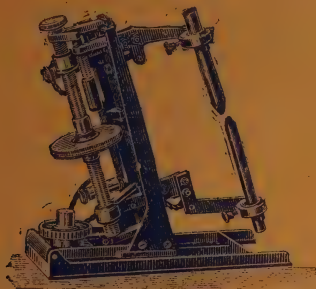
ROSS' NEW MODEL

Projection Arc Lamps.

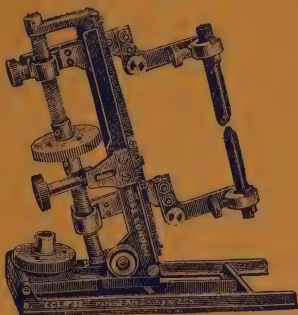
(Patent.)

Electricians and other Experts have stated that these are the best Lamps yet devised for Cinematograph Projection, Microscope, Photo - Micrographic and Projection Work generally.

They work at from 5 to 15 Amperes.



(A) Lamp.



(B) Lamp.

Briefly summarised the leading features of the Lamp are:—1. Very quick and accurate centering. 2. Great ease and comfort in manipulation. 3. No current in the Lamp itself, therefore less liability to "Shocks." 4. Great steadiness of the light. 5. Excellence of workmanship. 6. A moderate price.

Since first introduced the Lamp has been modified, so that it may also be useful in Laboratory work; this is known as Lamp B.

Price of the A Lamp - - £4 15 0

Price of the B Lamp - - 5 5 0

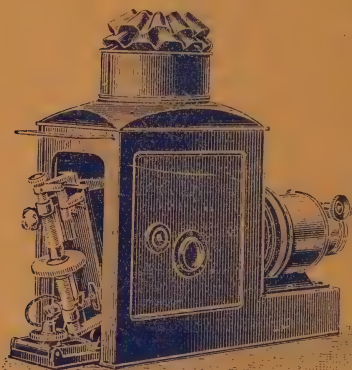
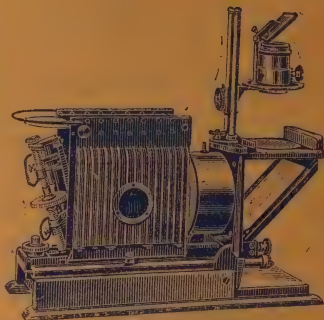
CASE FOR EITHER MODEL, 5s.

Sold by Leading Dealers everywhere.

ROSS'

- NEW - ARC LAMP

IS here shown fitted to a Lantern having a Body specially designed for Arc Lamp and very high-power jets. The working of this Lantern and Lamp combined is the very acme of perfection, and leaves nothing further to be desired.



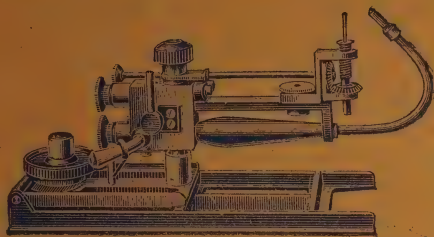
WHERE it is not considered necessary to incur the expense of the very perfect Lantern illustrated above, the New Lamp can be fitted to an inexpensive Russian Iron Lantern as here illustrated, where the lamp is shown exactly in the position it occupies when in use; its convenience will be readily noted.

Price of Lantern with Condenser and Objective	£5 0 0
Arc Lamp, A model	4 15 0
Do. B	5 5 0
Rheostats	from 5 5 0

SOLD BY LEADING DEALERS EVERYWHERE.

ROSS' "RADIANT" JET

(PATENT.)



THE leading advantage of the Jet is that the luminous area or "spot" is smaller than usual in proportion to the power of the Jet, but the *intensity* is much greater, and this, too, with a smaller consumption of gas.

No. I. is powerful enough for almost every purpose.

No. II. for use with screens of excessive size, and when the maximum amount of light must be had.

PRICE for either size **£4 4 0**

Or without the vertical and lateral motions, but adapted to fit on any ordinary lime tray ... **£3 10 0**

SOLD BY LEADING DEALERS EVERYWHERE.

Best Electric Light Carbons.

THE quality of the Carbon Rods used in the production of the Electric Light is of the greatest importance, for with poor carbons the very best lamp is incapable of yielding a perfectly steady and satisfactory light.

Arrangements have therefore been made to supply best quality Carbon Rods of suitable size, pointed and cut to length for the Hepworth Optical Lamps.

Price per Half-dozen pairs:— s. d.

- | | |
|---|------------|
| 1. For Continuous Current, 5 to 10 ampères | 1 0 |
| (7 mm. solid and 10 mm. cored.) | |
| 2. For Continuous Current, 10 to 15 ampères | 1 6 |
| (10 mm. solid and 13 mm. cored.) | |
| 3. For Alternating Current, 5 to 10 ampères | 1 3 |
| (10 mm. cored.) | |
| 4. For Alternating Current, 10 to 15 ampères | 1 9 |
| (13 mm. cored.) | |

THE ABOVE PRICES ARE NET.

ROSS'

"THE POWER AND
FIELD OF A
TELESCOPE IN THE
COMPASS OF AN
OPERA GLASS."

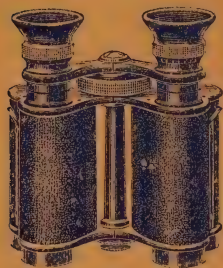


FIG. 1.

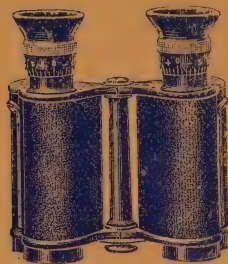


FIG. 2.

Patent New Model Prism Binocular Glasses.

LEADING FEATURES.

Perfect Mechanical and Optical Construction and Elegant Design.

Great Compactness and Portability combined with Light Weight.

Brilliant Definition, High Magnifying Power, and Large Field.

Great Illuminating and Penetrating Power with Long Range.

Simultaneous Focussing and Convenient Eye Distance Adjustments.

Universal and Serviceable, Rigid, Strong, and Handy Field Glasses.

POWER, SIZE, and WEIGHT, with Simultaneous Focussing Adjustment (Fig. 1):—

POWER.		SIZE.		WEIGHT.
8 times	...	4½ in. high, 3½ in. wide	...	15 oz.
10 "	...	5 " " 3½ " "	...	16 "
12 "	...	5½ " " 3½ " "	...	17 "

In the case of the model focussing only by Eyepiece Adjustment (Fig. 2), the weight of each size is about 2 ounces less.

For Prices See Following Page.

ROSS' PATENT NEW MODEL

Prism Binocular Glasses.

With Simultaneous Screw Focussing Adjustment and One Adjustable Eye-piece (Fig. 1).

PRICES IN LONDON.

Magnification Diameters.	BINOCULAR.			Marks.	Francs.
	£	s.	d.		
8	8	10	0	170	215
10	9	10	0	190	240
12	10	10	0	210	265

Focussing by Adjustment of Eye-pieces (Fig. 2).

Each eye-piece should be focussed separately, so as to allow for differences in refraction of the eyes. The eye-cups can be turned up or down, until a distant object appears clearly defined.

PRICES IN LONDON.

Magnification Diameters.	BINOCULAR.			Marks.	Francs.
	£	s.	d.		
8	8	0	0	160	200
10	9	0	0	180	225
12	10	0	0	200	250

MONOCULAR GLASSES.

Focussing by Adjustment of Eye-piece only.

PRICES IN LONDON.

Magnification Diameters.	£	s.	d.	Marks.	Fran s.
8	3	15	0	75	94
10	4	5	0	85	107
12	4	15	0	95	120

Each B nocular and Monocular Glass is supplied with a best quality Leather Sling Case, which is smaller and neater in appearance than those supplied with any other Prismatic Binoculars of equal power.

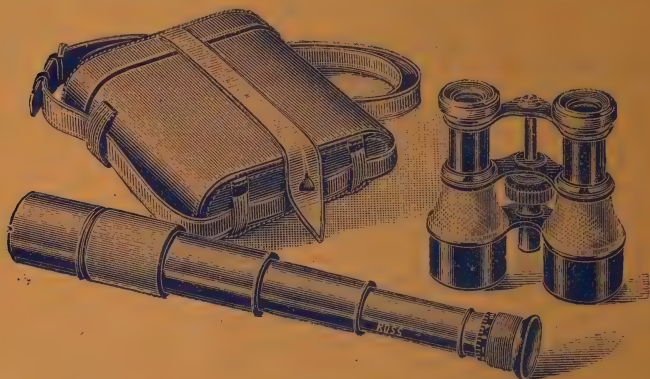
The above prices are for net prompt cash.

SOLD BY ALL LEADING OPTICIANS AND DEALERS.

ROSS' NEW COMBINATION

SPECIALLY
SUITABLE FOR
OFFICERS ON
ACTIVE SERVICE,
SPORTSMEN,
TRAVELLERS, &c.

Field Glass and Telescope Sets.



The Field Glass is constructed with a power of 4 times that it may be useful as a Night Glass as well as for ordinary field work.

The Telescope is intended for the examination of objects in detail and for long ranges. It is fitted with a rotating screw Eye-cup, whereby focussing is attained with much greater facility than with an ordinary telescope, with the added advantage that no refocussing is required, the instrument being immediately available for use by simply extending it to its full length.

Field Glass,
Power 4 Times.



Telescope,
Power 15 Times.

BRILLIANT DEFINITION.

PRICE in compact Solid Leather Sling Case	28	10	0
„ with Telescope of 20 times magnification	8	0	0

THE ABOVE PRICES ARE NET.

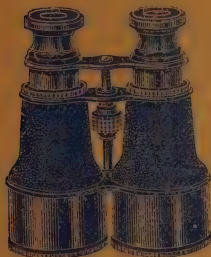
ROSS'

MILITARY, NAVAL, and RACE BINOCULAR GLASSES.

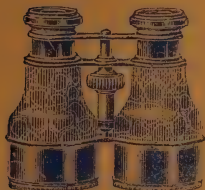
Highest Quality and Finish with Superior Lenses.



MILITARY MODEL.



MARINE MODEL.



SQUAT MODEL.

No.	1	2	2A	3	4	5	6
Diam. of Ob. Glasses	1 $\frac{1}{10}$	1 $\frac{1}{10}$	1 $\frac{4}{10}$	1 $\frac{6}{10}$	1 $\frac{8}{10}$	2 $\frac{1}{10}$	2 $\frac{2}{10}$
DESCRIPTION.	£ s.	£ s.	£ s.	£ s.	£ s.	£ s.	£ s.
12 LENSES.							
Military Glass, spec. design, bronzed or japanned	2 10	3 0	3 10	4 0	4 10	5 0	6 0
Military Glass, Aluminium Mount, highly recommended	3 15	4 10	5 5	6 0	6 15	7 10	9 0
Two-Draw (Extra Power) Glass, bronzed or covrd	—	—	—	5 0	5 15	6 10	7 10
Two-Draw Aluminium Glass, extremely light	—	—	—	7 10	8 10	9 10	11 0
6 LENSES.							
Marine Night Glass, hand-made, as used in the British and Foreign Navies, japanned or covered	—	—	—	—	3 0	3 15	4 10
Second quality Ngt. Glass, japanned or covered	—	—	—	—	2 0	2 10	3 0
New Squat Model for Field or Theatre—							
With 12 Lenses, mounted in Brass	—	—	—	4 10	—	—	6 0
Do. do. Aluminium	—	—	—	6 15	—	—	9 0
With 6 Lenses for Night Work at Sea	—	—	—	2 5	—	—	3 10

JOINTED CENTRES, to Nos. 1 to 3, 10/6 ex. 4 to 6, 21/- ex.

These Glasses are also supplied covered with Pigskin, Crocodile, and other fancy leathers at a small extra cost.

ROSS' MILITARY AND SPORTING TELESCOPES.



No.	DESCRIPTION.	Magnifying Power.	No. of Draws.	Length.		Price in light metal very durable.	Price in aluminium
				Open.	Closed.		
1	Watcher, with loops and sling	Times.				£ s. d.	£ s. d.
		15	2	23½	10½	2 15 0	—
1a	Ditto, in sling case	15	2	23½	10½	3 10 0	—
2	Reconnoitring "	20	3	21	8	4 0 0	6 0 0
3	Deer Stalking "	20	3	36½	10½	5 0 0	7 10 0
3a	Military ... "	20	4	30	8½	5 10 0	8 0 0
4	Stalking Pancratic,,	20, 25 and 30	3	30½	10½	6 0 0	—
4a	Military ... "	20	4	30	8	8 0 0	—
4b	Reconnoitring "	20	3	21	8	6 10 0	10 0 0
4c	Deer Stalking "	20	3	30	10½	6 15 0	10 10 0
5	Stalking Pancratic,,	20, 25 and 30	3	30	10½	7 7 0	11 10 0
5a	Military ... "	30, 40 and 50	4	43	12½	10 0 0	—
6	Deer Stalking "	20	3	30½	10½	9 0 0	14 0 0
6a	Military ... "	30	4	43	12½	16 10 0	—



Ross' Naval Telescopes

GERMAN SILVER MOUNTS
AND ONE DRAW.

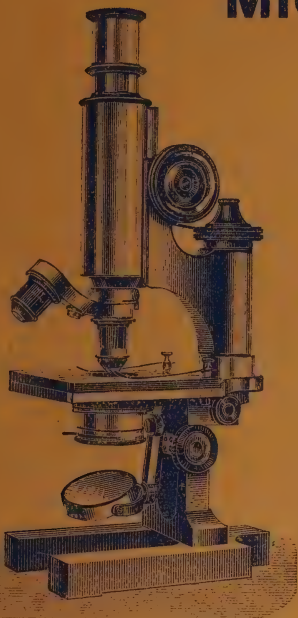
No.	Magnifying power.	Aperture in Inches.	Area of Light.	Length.		Price.
				Open.	Closed.	
1	14	1½	1'227	23½	17½	£2 10 0
2	20	1½	2'073	31	25	4 0 0
3	20	1½	2'761	31	25	6 0 0
4	20	2½	3'546	31	25	8 0 0
5	30, 40 and 50	2½	3'546	43	37½	9 0 0
6	30	2½	4'908	43	37½	12 0 0
7	30	2½	5'939	43	37½	15 0 0
8	50, 60 and 70	2½	5'939	57	dividing.	16 0 0

The Nos. 7 and 8 Naval Telescopes are specially suitable when mounted on a Tripod Stand for coastguard work and look-out stations. A Rack and Pinion for easy focussing is supplied to these when required. Extra 30/-

	Nos. 1	2	3	4	5	6	7
Signals, extra ...	5/-	7/6	7/6	7/6	7/6	10/-	10/-
Caps and Slings, extra ...	10/6	10/6	12/-	12/-	—	—	—

ROSS' New "STANDARD"

MICROSCOPE STANDS.



**Specially Designed for
the use of
BACTERIOLOGISTS,
DEMONSTRATORS,
TEACHERS, STUDENTS,
ANALYSTS, and
Every Department of
Microscopical Research.**

Abridged Specification.

The **Body Tube** has the Continental length of 160 mm, with the standard screw of the Royal Microscopical Society.

The **Stage** is attached to the lower portion of the limb so that great rigidity is secured. The stage plate is of vulcanite.

The **Mechanical Stage** has rectangular movements of about two inches.

The **coarse adjustment** is unusually substantial and sensitive. The motion obtained is sufficiently accurate for all necessary focussing without using the fine adjustment except in the case of high power objectives.

The **fine adjustment** affords an extremely sensitive and decided movement by the direct action of the micrometer screw.

Special New "Standard" Microscope for Students.

In workmanship and efficiency the "S.S." Microscope is equal to the more elaborate Instruments, and on account of its stability, completeness, and moderate price, it is particularly adapted to the requirements of Medical Schools and other Educational Institutions.

Full particulars and Estimates sent free on application.

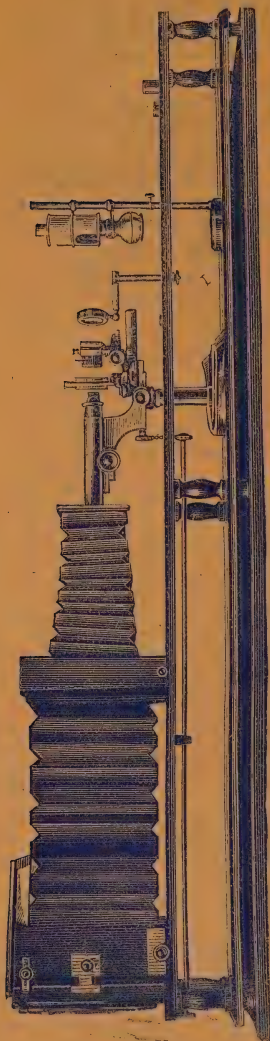


PHOTO-MICROGRAPHIC CAMERAS.

THESE Cameras are of the most substantial construction, and yet capable of the most delicate adjustment. The superstructure is fixed on a solid mahogany baseboard. The top board on which the camera runs is so arranged that the Microscope, Camera, Condenser, Lamp, &c., are all central with each other, and the whole can be adjusted for work both quickly and accurately.

The following prices include Baseboard, Camera, with one dark slide, and fine adjustment rod. Microscopes and other optical parts can be supplied at the catalogue prices, or customers' own Apparatus may be used, a small charge being made for adaptation of same.

Size of Camera.	Length of Baseboard.	Extension of bellows, including cone.	Price, exclusive of any necessary adapting.	A cheap conical - shaped mahogany Camera for attachment to tube of Microscope can be supplied for 50/-, including one $4\frac{1}{4} \times 3\frac{1}{4}$ single dark slide
$4\frac{1}{4} \times 3\frac{1}{4}$	48 inches.	18 inches.	£11 0 0	
$6\frac{1}{4} \times 4\frac{1}{4}$	60 "	30 "	13 0 0	
$8\frac{1}{4} \times 6\frac{1}{4}$	70 "	36 "	15 0 0	
10×8	80 "	44 "	18 0 0	
12×10	90 "	54 "	21 0 0	

FIVE PER CENT. DISCOUNT FOR CASH.

ROSS, Ltd. Manufacturing Opticians

*To the Principal Courts
and Governments,
Universities & Hospitals.*

TO THE ROYAL FAMILY.

*Medals & Highest Awards
at all great
International Exhibitions.*

Terms.

ALL ORDERS from abroad must be accompanied by a remittance or draft on a London House.

Orders from Home Customers who have not regular ledger accounts must also be accompanied by a remittance or London reference.

Cheques should be crossed London & Westminster Bank, Marylebone Branch, and Post Office Orders made payable at the Western District Office, Vere Street, London, W.

Unless instructions are received to the contrary, all Goods are forwarded by the quickest routes, and insured at the customer's expense.

General Indents from Foreign Customers are executed on moderate terms and receive the most prompt and careful attention.

Experienced packers only are employed, and all possible care is exercised to insure safe transit. ROSS, Limited, do not therefore hold themselves responsible for any breakages or damage that may occur after the Goods leave their Establishments.

TELEGRAPHIC ADDRESSES—

111, NEW BOND ST., LONDON, W., "ROSSANO, LONDON."
31, COCKSPUR ST., LONDON, S.W., "ANASTIGMAT, LONDON."
Works—CLAPHAM COMMON, "ROSSICASTE, LONDON."

Contractors to His Majesty's Governments, British and Colonial.
Also to the principal Foreign Governments.

111, NEW BOND STREET, LONDON, W.; and
31, COCKSPUR ST., CHARING CROSS, S.W.
Works—CLAPHAM; COMMON, S.W.

ABRIDGED CATALOGUE

for 1903

Cancelling all previous Lists..

GOLD MEDALS AND HIGHEST AWARDS

LONDON, 1851 · PARIS, 1867 · LONDON, 1862
 PHILADELPHIA, 1876 · PARIS, 1878 · ANTWERP, 1878
 INVENTIONS EXHIBITION, 1885 · SYDNEY, 1879

Grand Prix and Gold Medal Paris
 Exposition Universelle, 1889.

KINGSTON, JAMAICA, 1891 · CHICAGO, 1893

Grand Prix, Diploma of Honour & Gold
 Silver & Bronze Medals, Brussels, 1897.

**GRAND PRIX &
GOLD MEDAL** PARIS 1900.

ROSS, LTD.,

MANUFACTURING OPTICIANS.

*Contractors to His Majesty's
 Governments,
 British & Colonial.*

*Also to the
 Principal Foreign
 Governments*

ESTABLISHED 1830.

ABRIDGED CATALOGUE.

COMPLETE CATALOGUE WILL BE POSTED
FREE ON APPLICATION.

Raines & Co.,

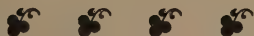
ARTISTS,

ENLARGERS,

PRINTERS,

HALF-TONE

Block Engravers.



Photographic Works,

EALING,

LONDON, W.

TELEGRAMS: "RAINES," EALING.

TELEPHONE: 64, EALING.

Bromide Enlargements.

BLACK AND WHITE AND SEPIA.

ON PAPER (Single Copies).

ORDINARY (Rough or Smooth), PLATINO MATTE (Rough or Smooth),
NIKKO (White or Pink), CREAM CRAYON or ROYAL.

SIZE.	Black & White. Enlargement. Unmounted.	Sepia Enlargement Unmounted.	Rough Mounting Extra.	Mounting on Plate Sunk Mounts, Extra.		Cut Out Mounts, 6 Sheet.	Cut Out Mounts, 12 Sheet.	Finishing in Black and White or Monochrome Extra.			Finishing in Water or Oil Colours Extra.	
				2nd Q'ty	1st Q'ty			3rd Class	2nd Class	1st Class	2nd Class	1st Class
6½ × 4½	-9	1/0	-1	-3	-4	-4	-8	1/3	3/0	6/0	7/6	15/0
8½ × 6½	1/3	1/8	-2	-6	-8	-6	1/0	1/6	4/0	8/0	10/6	19/6
10 × 8	1/6	2/0	-3	-6	-9	-6	1/0	2/0	5/0	10/0	12/0	21/0
12 × 7½	1/9	2/4	-4	-6	-9	-8	1/4	3/0	6/0	12/0	13/0	22/0
12 × 10	1/9	2/4	-4	-6	-9	-8	1/4	3/0	6/0	12/0	13/0	22/0
15 × 12	2/6	3/4	-6	-8	1/0	1/0	2/0	4/0	9/0	15/0	17/0	31/6
17 × 10½	2/6	3/4	-9	1/0	1/6	1/3	2/6	4/0	9/0	15/0	17/0	31/6
18 × 15	3/3	4/4	-9	1/0	1/9	1/3	2/6	5/0	10/0	20/0	25/0	40/0
20 × 16	3/6	4/6	-9	1/0	1/9	1/3	2/6	5/6	11/0	22/0	30/0	48/0
23 × 17	4/0	5/4	1/0	2/0	3/0	1/6	3/0	6/0	12/0	24/0	32/0	50/0
24 × 18	5/0	6/8	1/0	..	3/6	2/0	4/0	6/0	12/0	24/0	36/0	63/0
24 × 20	5/6	7/4	1/0	..	3/6	2/6	5/0	6/0	12/0	24/0	36/0	63/0
29 × 17½	8/6	11/4	1/6	..	4/0	3/0	7/0	9/6	18/6	30/0	42/0	67/0
30 × 22	8/6	11/4	1/6	..	4/0	3/6	7/0	9/6	18/6	30/0	42/0	67/0
30 × 25	10/0	13/4	2/0	..	5/0	4/0	8/0	9/6	18/6	30/0	47/0	75/0
36 × 28	13/6	18/0	3/6	..	12/6	7/0	14/0	20/0	30/0	40/0	60/0	80/0
40 × 30	15/0	20/0	4/0	..	..	9/0	18/0	30/0	45/0	60/0	80/0	100/0
50 × 30	20/0	27/0	15/0	Mounted on Canvas Stretcher. Special Quotation for finishing.								
48 × 36	25/0	34/0	15/0									
60 × 30	25/0	34/0	15/0									
60 × 40	30/0	40/0	17/6									
96 × 50	60/0	..	25/0									

PANORAM SIZES.

12 × 4	1/3	1/8	-3	..	-11	-8	1/4	2/0	5/0	10/0	12/0	21/0
18 × 6	2/6	3/4	-6	..	1/6	1/3	2/6	4/0	9/0	15/0	17/0	31/6
30 × 9½	5/6	7/4	1/0	..	3/0	3/0	7/0	6/0	12/0	24/0	36/0	63/0

† Best Plate Paper Mounts, Plate Sunk, with Paste down India Tint.

‡ A cheaper Board, Plate Sunk, with Paste Down India Tint but not faced with plate Paper.

It should be taken into consideration that Enlargements from Copies or Positives require **extra Finish**, the work done being in proportion to the amount paid.

The Finishing on Groups of two figures is charged at one-third extra, and of over two at special rates, but if finished at above prices, the work is distributed over the several figures.

We shall be pleased to supply Forms for Ordering Enlargements, which will be found to greatly facilitate the despatch of orders, and obviate the chance of mistakes.

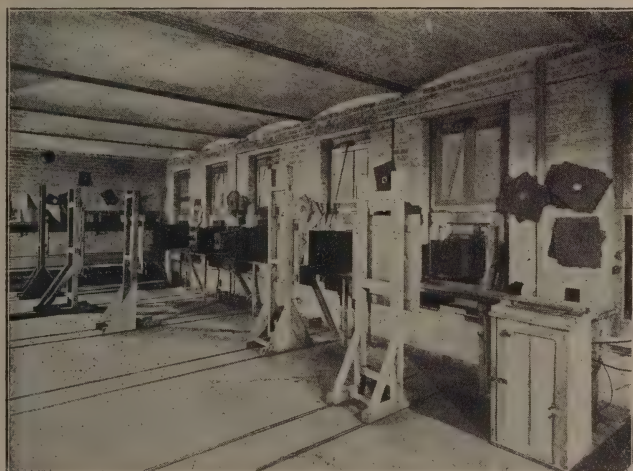
RAINES & Co., EALING.

Oval Bromide Enlargements.

BLACK AND WHITE AND SEPIA.

Mounted on Best Plate Paper Mounts, with Oval Plate Mark and India Tint.

SIZE.	Number of Copies from same Negative.	Black and White Enl'gts. Mounted on Oval Tint, Plate-mark Mount, Each.	Sepia Enlargements mounted on Oval Tint, Plate-mark Mount, Each.	Finishing in Black and White, or Monochrome Extra, Each,			Finishing in Water or Oil Colour, Extra, Each.	
				3rd Class.	2nd Class.	1st Class.	2nd Class.	1st Class.
6½ × 4¾	1 copy	1/3	1/6	1/3	3/0	6/0	7/6	15/0
	3 copies	1/2	1/5	1/3	3/0	6/0	7/0	14/0
	6 "	1/1	1/4	1/2	2/9	5/6	6/6	12/0
8½ × 6½	12 "	-11	1/2	1/1	2/6	5/0	6/0	10/0
	1 copy	2/3	2/8	1/6	4/0	8/0	10/6	19/6
	3 copies	2/1	2/6	1/6	3/9	7/6	10/0	19/0
10 × 8	6 "	1/11	2/4	1/4	3/6	7/0	9/6	18/0
	12 "	1/9	2/2	1/2	3/3	6/6	9/0	17/0
	1 copy	2/9	3/3	2/0	5/0	10/0	12/0	21/0
12 × 10	3 copies	2/7	3/1	1/10	4/9	9/6	11/6	20/0
	6 copies	2/5	2/11	1/8	4/6	9/0	11/0	19/0
	12 "	2/4	2/9	1/6	4/3	8/6	10/6	18/0
15 × 12	1 copy	3/0	3/6	3/0	6/0	12/0	13/0	22/0
	3 copies	2/10	3/4	2/10	5/9	11/6	12/6	21/0
	6 "	2/8	3/2	2/8	5/6	11/0	12/0	20/0
18 × 12	12 "	2/6	3/0	2/6	5/3	10/6	11/6	19/0
	1 copy	4/0	4/9	4/0	9/0	15/0	17/0	31/6
	3 copies	3/9	4/6	3/9	8/6	14/0	16/0	30/0
21 × 12	6 "	3/6	4/3	3/6	8/0	13/0	15/0	28/0
	12 "	3/3	4/0	3/3	7/6	12/0	14/0	26/0



BROMIDE ENLARGING ROOM.

RAINES & Co., EALING.

Circular Bromide Enlargements.

BLACK AND WHITE AND SEPIA.

Mounted on Best Paper Plate Mounts, with Circular Plate Mark and India Tint.

SIZE.	Number of Copies from same Negative.	Black and White Enlargements Mounted Each	Sepia Enlargements Mounted Each.	Finishing in Black and White, or Monochrome, Extra. Each.			Finishing in Water or Oil Colour, Extra, Each.	
				3rd Class	2nd Class	1st Class.	2nd Class	1st Class
6 in. diam...	1 copy	1/9	2/2	1/3	3/0	6/0	7/6	15/0
	3 copies	1/7	2/0	1/3	3/0	6/0	7/0	14/0
	6 "	1/5	1/10	1/2	2/9	5/6	6/6	12/0
	12 "	1/3	1/8	1/1	2/6	5/0	6/0	10/0
8 in. diam...	1 copy	2/6	3/0	1/6	4/0	8/0	10/6	19/6
	3 copies	2/4	2/10	1/6	3/9	7/6	10/0	19/0
	6 "	2/2	2/8	1/4	3/6	7/0	9/6	18/0
	12 "	2/0	2/6	1/2	3/3	6/6	9/0	17/0
10 in. diam...	1 copy	3/0	3/8	2/0	5/0	10/0	12/0	21/0
	3 copies	2/10	3/6	1/10	4/9	9/6	11/6	20/0
	6 "	2/8	3/4	1/8	4/6	9/0	11/0	19/0
	12 "	2/6	3/2	1/6	4/3	8/6	10/6	18/0
12 in. diam...	1 copy	3/6	4/0	3/9	7/6	15/0	17/0	27/0
	3 copies	3/3	3/9	3/6	7/3	14/6	16/0	25/0
	6 "	3/0	3/6	3/3	7/0	14/0	15/0	23/0
	12 "	2/9	3/3	3/0	6/9	13/6	14/0	21/0
15 in. diam...	1 copy	6/6	7/6	6/0	11/0	18/6	21/0	38/6
	3 copies	6/3	7/3	5/9	10/6	17/6	19/0	36/6
	6 "	6/0	7/0	5/6	10/0	16/6	17/0	34/6
	12 "	5/9	6/9	5/3	9/6	15/6	15/0	32/6



ARTISTS' STUDIO.

RAINES & Co., EALING.

Bromide Enlargements.

BLACK AND WHITE AND SEPIA.
ON OPAL (Single Copies).

Solid or Vignette.

SIZE.	Black and White Enlarge-ment.	Sepia Enlarge-ment.	Finishing in Black and White or Monochrome extra.			Finishing in Water Colours Extra.	
			3rd Class.	2nd Class.	1st Class.	2nd Class.	1st Class.
$6\frac{1}{2} \times 4\frac{3}{4}$	1/9	2/4	1/6	3/0	6/0	7/6	15/0
$8\frac{1}{2} \times 6\frac{1}{2}$	2/0	2/8	2/0	4/0	8/0	11/0	20/0
10 \times 8	3/0	4/0	2/6	5/6	11/0	13/0	22/0
12 \times $7\frac{1}{2}$ }	3/6	4/6	3/6	7/0	13/6	14/0	24/0
OR							
12 \times 10 }	5/6	7/6	4/6	10/0	16/6	17/6	32/6
15 \times 12 }							
17 \times $10\frac{1}{2}$	6/6	8/6	4/6	10/0	16/6	17/6	32/6
18 \times 15	12/6	16/6	5/6	11/0	22/0	26/0	40/0
20 \times 16	15/0	20/0	6/0	12/0	24/0	31/0	50/0
24 \times 18	20/0	26/6	7/0	14/0	26/0	40/0	65/0

Bromide Enlargements or Contact Prints. ON OPAL.

ANY SIZE UP TO $\frac{1}{2}$ PLATE.

Number of Copies.	Black and White.	Sepia.	Finishing in Black and White or Monochrome Extra			Finishing in Water Colours Extra.		
			3rd Class.	2nd Class.	1st Class.	3rd Class.	2nd Class.	1st Class.
Single Copy.	1/9 Each.	2/4 Each.	1/6 Each.	3/0 Each.	6/0 Each.	4/6 Each.	7/6 Each.	15/0 Each.
3 from same Neg.	1/6	2/0	1/6	3/0	6/0	4/0	7/0	14/0
6 " " "	1/4	1/0	1/4	2/9	5/6	3/6	6/6	12/6
12 " " "	1/2	1/5	1/2	2/6	5/0	3/0	6/0	11/0

Bromide Enlargements on Paper.

WARRANTED NOT TO CRACK OR PEEL OFF.

SIZE.	Enlarge-ment.	Painting in Oil Colours Extra.			SIZE.	Enlarge-ment.	Painting in Oil Colours Extra.		
		3rd Class.	2nd Class.	1st Class.			3rd Class.	2nd Class.	1st Class.
12 \times 10	5/6	15/0	30/0	50/0	24 \times 20	15/6	40/0	60/0	90/0
14 \times 12	7/0	16/0	35/0	55/0	30 \times 25	20/0	45/0	65/0	100/0
18 \times 14	8/0	18/0	40/0	60/0	36 \times 28	25/0	50/0	80/0	120/0
21 \times 14	9/6	20/0	45/0	70/0	44 \times 34	35/0	60/0	90/0	130/0
20 \times 16	11/0	30/0	50/0	80/0	48 \times 36	45/0	80/0	110/0	160/0
21 \times 17	12/0	35/0	55/0	85/0	50 \times 40	55/0	100/0	150/0	200/0
24 \times 18	14/0	40/0	60/0	90/0					

These Enlargements are produced on specially prepared Canvas, stretched on wedged frames.

RAINES & Co., EALING.

Bromide Contact Prints. On Paper.

ORDINARY (Rough or Smooth) PLATINO MATTE (Rough or Smooth),
NIKKO (White or Pink), CREAM CRAYON or ROYAL.

SIZE OF PRINT.		Prints, Unmounted (from one negative)						Prints, including Mounting on Photographer's Own Mounts, and Spotting.				
Untrimmed.	Trimmed.	Single Copies.	12	25	50	100	500	12	25	50	100	500
C.D.V.	3½ × 2½	-3	2/0	3/9	7/0	11/0	42/0	2/6	4/6	8/6	14/6	55/0
¼-plate	4 × 3	-3	2/0	3/9	7/0	11/0	42/0	2/6	4/6	8/6	14/6	55/0
Cabinet	5¼ × 4	-4	3/6	6/9	10/6	19/6	80/0	4/2	8/0	13/2	25/0	100/0
½-plate	6 × 4½	-4	3/6	6/9	10/6	19/6	80/0	4/2	8/0	13/2	25/0	100/0
7 × 5	6½ × 4½	-5	4/6	8/0	14/6	27/0	125/0	5/9	10/3	18/6	34/6	160/0
8½ × 6½	8 × 6	-7	6/6	12/6	20/0	37/6	170/0	8/2	15/6	25/0	46/6	212/0
9 × 7	8½ × 6½	-7	6/6	12/6	20/0	37/6	170/0	8/2	15/6	25/0	46/6	212/0
10 × 8	9½ × 7½	-10	8/0	15/0	28/0	50/0	220/0	10/0	18/9	35/0	62/6	275/0
12 × 10	11½ × 9½	1/2	12/0	22/0	40/0	75/0	333/0	15/0	27/6	50/0	94/0	416/0
15 × 12	14½ × 11½	1/9	18/0	33/0	60/0	112/0	500/0	22/6	41/6	75/0	140/0	625/0

SEPIA TONING 33⅓%. EXTRA.

Special quotations for mounting in any style, or for larger quantities.



COUNTING HOUSE.

RAINES & Co., EALING.

CARBON ENLARGEMENTS—On Paper.

[SIZE.	Printed Solid, or Vignette.	Extra Copies.	Rough Mount- ing and Spotting.	Mounting on India Tint with Plate Mark and Spotting.	Mounting on Plate Mark without Tint and Spotting.	Cut Out Mounts, 16 Sheet.	Cut Out Mounts 12 Sheet.	Finishing in Monochrome, Extra.			Finishing in Water or Oil Colours, Extra.	
								3rd Class.	2nd Class.	1st Class.	2nd Class.	1st Class.
4 1/2 x 4 3/4	4/6	-6	-3	-6	-6	-4	-8	1/3	3/0	6/0	7/6	15/0
8 1/2 x 6 1/2	6/0	-8	-4	-8	-7	-6	1/0	1/6	4/0	8/0	10/6	19/6
10 x 8	6/6	-9	-6	1/0	-8	-6	1/0	2/0	5/0	10/0	12/0	21/0
12 x 7 1/2	7/0	1/2	-6	1/0	-9	-8	1/4	3/0	6/0	12/0	13/0	22/0
12 x 10												
15 x 12	10/0	1/8	-8	1/4	1/0	1/0	2/0	4/0	9/0	15/0	17/0	31/6
17 x 10 1/2	10/0	1/8	-8	1/9	1/6	1/3	2/6	4/0	9/0	15/0	17/0	31/6
18 x 15	13/6	2/3	1/1	2/0	1/9	1/3	2/6	5/0	10/0	20/0	25/0	40/0
20 x 16	14/6	3/0	1/6	2/0	1/9	1/3	2/6	5/6	11/0	22/0	32/0	48/0
23 x 17	15/0	3/9	1/6	3/6	3/0	1/6	3/0	6/0	12/0	24/0	32/0	50/0
24 x 18	16/0	3/9	1/6	3/6	3/0	2/0	4/0	6/0	12/0	24/0	36/0	63/0
29 x 20	17/0	4/0	1/6	3/9	3/3	2/6	5/0	6/0	12/0	24/0	42/0	67/0
30 x 17 1/2	31/0	7/6	1/8	4/9	4/3	3/6	7/0	9/6	18/6	30/0	42/0	67/0
30 x 22	31/0	7/6	1/8	4/9	4/3	3/6	7/0	9/6	18/6	30/0	42/0	67/0
30 x 25	33/0	10/0	2/3	5/9	..	4/0	8/0	9/6	18/6	30/0	47/0	75/0
30 x 28	33/0	10/0	2/3	5/9	..	4/0	8/0	9/6	18/6	30/0	47/0	75/0
36 x 30	38/0	14/6	5/0	12/6	..	7/0	14/0	20/0	30/0	40/0	60/0	80/0
40 x 30	44/0	17/6	6/0	..	..	9/0	18/0	30/0	45/0	60/0	80/0	100/0
44 x 34	54/0	21/0	9/6	..	..	..	..	40/0	60/0	80/0	100/0	125/0
48 x 36	65/0	24/0	9/6	..	..	..	..	45/0	65/0	85/0	110/0	135/0

COLOURS—Standard Brown, Standard Purple, Warm Black, Engraving Black, Sepia, Warm Sepia, Cool Sepia, Red Chalk, Terra Cotta, Chocolate Brown, Ruby Brown, Dark Blue, Sea Green, Portrait Brown, Portrait Purple.
ALL ENLARGEMENTS ARE PRINTED IN STANDARD BROWN, UNLESS OTHERWISE ORDERED.

CARBON PRINTS—On Ivory.

SIZE OF IVORY.	1 3/4 x 1 1/2	2 1/4 x 1 3/4	2 1/2 x 2	3 x 2 1/2	3 1/2 x 2 3/4	3 3/4 x 3	4 1/4 x 3 1/4	5 x 4
Price—Enlarged or Reduced. From Customers own Negatives.	5/0 3/0	5/6 3/6	7/0 5/6	8/0 5/6	9/0 6/0	9/6 6/6	10/0 8/0	12/0 9/6
Finishing in Water Colours (Extra.)								
1st Class.	40/0	40/0	60/0	100/0	130/0	130/0	130/0	150/0
2nd Class.	20/0	20/0	30/0	50/0	65/0	65/0	65/0	75/0

Carbon Enlargements on Opal.

SIZE.	Plain Enlargement, Solid or Vignette.	Extra copies.	Finishing in Mono-chromo, Extra			Finishing in Water Colours, Extra.	
			3rd Class.	2nd Class.	1st Class.	2nd Class.	1st Class.
6½ × 4¾	5/6	1/3	1/6	3/0	6/0	7/6	15/0
8½ × 6½	6/6	1/6	2/0	4/0	8/0	11/0	20/0
10 × 8	8/0	2/0	2/6	5/6	11/0	13/0	22/0
12 × 10	9/0	2/6	3/6	7/0	13/6	14/0	24/0
15 × 12	13/0	3/9	4/6	10/0	16/6	17/6	32/6
17 × 10½	13/0	3/9	4/6	10/0	16/6	17/6	32/6
18 × 15	19/0	6/0	5/6	11/0	22/0	26/0	42/0
20 × 16	22/0	8/0	6/0	12/0	24/0	31/0	50/0
24 × 18	28/0	10/6	7/0	14/0	26/0	40/0	65/0

NEGATIVES.—To become customer's own property.

Reduced, Enlarged or Reproduced, Same Size.

SIZE.	PRICE.	SIZE.	PRICE.
4¼ × 3¼ ..	2/0	20 × 16 ..	12/0
6½ × 4¾ ..	2/6	24 × 18 ..	14/0
8½ × 6½ ..	4/0	30 × 24 ..	28/0
10 × 8 ..	5/0	36 × 28 ..	35/0
12 × 10 ..	6/0	40 × 30 ..	45/0
15 × 12 ..	8/6	48 × 36 ..	66/0
18 × 15 ..	10/0		

Negatives from Prints, Drawings, Photographs, Positives, &c.

SIZE.	PRICE.	SIZE.	PRICE.
4¼ × 3¼ ..	1/0	20 × 16 ..	16/6
6½ × 4¾ ..	1/6	24 × 18 ..	19/0
8½ × 6½ ..	2/6	30 × 24 ..	37/0
10 × 8 ..	3/6	36 × 28 ..	52/0
12 × 10 ..	5/0	40 × 30 ..	80/0
15 × 12 ..	7/6	48 × 36 ..	100/0
18 × 15 ..	12/6		



STUDIO NO. 1.

RAINES & Co., EALING.

Platinotype Enlargements.

SOLID OR VIGNETTE.

SIZE.	Price Unmounted.	Extra Copies Unmounted.	Rough Mounting & Spotting Extra.	Mounting on India Tint with Plate Mark and Spotting.	Cut out Mounts, 6 Sheet.	Cut Out Mounts, 12 Sheet.	Finishing in Black and White, Extra			Finishing in Water or Oil Colours, Extra.	
							3rd Class	2nd Class	1st Class	2nd Class	1st Class
6 $\frac{1}{2}$ X 4 $\frac{3}{4}$..	4/6	-4	-3	-6	-4	-8	1/3	3/0	6/0	7/6	15/0
8 $\frac{1}{2}$ X 6 $\frac{1}{2}$..	6/0	-8	-4	-8	-6	1/0	1/6	4/0	8/0	10/6	19/6
10 X 8 ..	6/3	-10	-6	1/0	-6	1/0	2/0	5/0	10/0	12/0	21/0
12 X 7 $\frac{1}{2}$..	7/6	1/4	-6	1/0	-8	1/4	3/0	6/0	12/0	13/0	22/0
12 X 10 ..	10/0	2/1	-8	1/4	1/0	2/0	4/0	9/0	15/0	17/0	31/6
15 X 12 ..	10/0	2/1	-8	2/0	1/3	2/6	4/0	9/0	15/0	17/0	31/6
17 X 10 $\frac{1}{2}$..	13/6	3/0	1/1	2/0	1/3	2/6	5/0	10/0	20/0	25/0	40/0
18 X 15 ..	16/0	4/3	1/6	2/0	1/3	2/6	5/6	11/0	22/0	30/0	48/0
23 X 17 ..	18/0	4/7	1/6	3/6	1/6	3/0	6/0	12/0	24/0	32/0	50/0
24 X 18 ..	18/6	5/0	1/6	3/6	2/0	4/0	6/0	12/0	24/0	36/0	63/0
24 X 20 ..	21/0	5/0	1/6	3/9	2/6	5/0	6/0	12/0	24/0	36/0	63/0
29 X 17 $\frac{1}{2}$..	35/0	12/0	1/8	4/9	3/6	7/0	9/6	18/6	30/0	42/0	67/0
30 X 22 ..	35/0	12/0	1/8	4/9	3/6	7/0	9/6	18/6	30/0	42/0	67/0
30 X 25 ..	37/0	14/0	2/3	5/9	4/0	8/0	9/6	18/6	30/0	47/0	75/0
36 X 28 ..	42/0	19/0	5/0	12/6	7/0	14/0	20/0	30/0	40/0	60/0	80/0
40 X 30 ..	50/0	24/0	6/0	..	9/0	18/0	30/0	45/0	60/0	80/0	100/0
48 X 36 ..	75/0	34/0	9/6	..	..	..	45/0	65/0	85/0	110/0	135/0



STUDIO No. 2.

RAINES & Co., EALING.

Printing Department.

SILVER, P.O.P., PLATINOTYPE, VELOX and COLLODIO-CHLORIDE

SIZE.	Silver or P.O.P. Unmounted per doz.	Platinotype, Velox, Collodio-Chloride, Unmounted, per doz.	Sepia Platinotype, Unmounted per doz.	Mounting, Spot- ting and Burnishing on Mounts supplied per doz.	Best G. R. E. Mounts & Mount- ing per doz.	Mounting on 1st quality Plate Sunk Mounts per doz.	Mounting on 2nd quality Plate Sunk Mounts per doz.
$3\frac{1}{2} \times 2\frac{1}{2}$ C.D.V.	1/0	2/3	2/10	-/5	-/9	1/0	-/10
$4\frac{1}{2} \times 3\frac{1}{4}$	1/3	2/9	3/6	-/6	1/0	1/4	1/1
5×4	1/9	3/6	4/4	-/6	1/3	1/9	1/6
$5\frac{1}{2} \times 4$ Cabinet	2/0	4/0	5/0	-/8	1/5	2/6	2/0
$7 \times 2\frac{1}{2}$ No. 1 Panoram . .	2/6	4/6	5/6			2/6	
$6\frac{1}{2} \times 4\frac{1}{2}$	2/6	4/6	5/6	1/0	2/0	3/0	2/3
$7\frac{1}{4} \times 3\frac{1}{2}$ Promenade . . .	3/0	5/6	6/10	1/3	2/9		
$12 \times 3\frac{1}{2}$ No 4 Panoram . .	3/6	6/0	7/6			3/0	
$7 \times 5\frac{1}{2}$	3/6	6/0	7/6	1/4	3/0		
$8\frac{1}{2} \times 6\frac{1}{2}$	4/0	7/6	9/0	1/9	3/6	5/0	3/0
9×7	5/0	9/0	11/0	2/3	4/6		
10×8	6/6	10/0	12/6	2/3	5/3	7/0	5/0
11×7 Panel	8/0	12/0	15/0	2/6	8/6		
11×9	9/0	14/0	17/6	3/6	8/6		
$12 \times 7\frac{1}{2}$ }	10/0	16/0	20/0	4/0	8/6	8/0	6/0
12×10 }							
15×12	18/0	25/0	31/0	5/0	13/0	10/0	7/0
18×15	29/0	36/0	45/0	9/0	30/0	18/0	13/0
23×17	32/0	55/0	68/0	12/0	60/0	30/0	21/0
26×20		60/0	75/0	15/0			



PRINTING.

RAINES & Co., EALING.

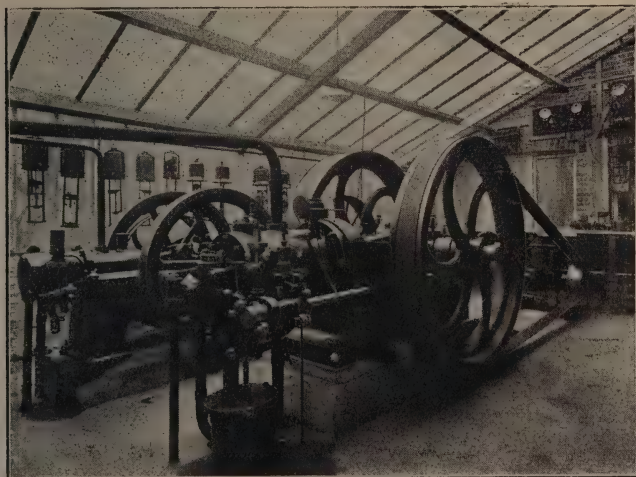
Carbon Printing.

COLOURS—Standard Brown, Standard Purple, Warm Black, Engraving Black, Sepia, Warm Sepia, Cool Sepia, Red Chalk, Terra Cotta, Chocolate Brown, Ruby Brown, Dark Blue, Sea Green, Portrait Brown, Portrait Purple.

SIZE.	SINGLE TRANSFER.				DOUBLE TRANSFER.			
	Paper.		Opal.		Paper		Opal.	
	Each.	Doz.	Each.	Doz.	Each.	Doz.	Each.	Doz.
4½ × 3½	-/4	3/6	1/0	11/0	-/5	4/0	1/0	10/6
5 × 4	-/4	3/6	1/0	11/0	-/5	4/0	1/0	10/6
6½ × 4½	-/6	4/6	1/3	13/0	-/6	4/6	1/4	13/6
8½ × 6½	-/8	6/6	1/6	16/0	-/9	7/6	1/9	18/0
10 × 8	-/9	8/6	2/0	22/0	-/10	9/0	2/3	24/0
12 × 10	1/2	12/0	2/6	25/0	1/6	14/0	3/0	30/0
15 × 12	1/8	18/0	3/9	41/0	1/9	20/0	4/6	48/0
17 × 10½	1/8	18/0	3/9	41/0	1/9	20/0	4/6	48/0
18 × 15	2/3	22/0	6/0	62/0	2/6	25/0	7/0	72/0
20 × 16	3/0	33/0	8/0	88/0	3/3	36/0	10/0	108/0
24 × 18	3/9	42/0	10/6	110/0	4/0	45/0	14/0	136/0

Special Low Terms for Large Quantities for Publication Purposes.

CARBON TISSUE COLOUR CHARTS—We supply these Charts containing 15 colours which we use for Carbon printing, at the price of 1/-. These Charts are of great use as a guide to colour required.



ENGINE ROOM.

RAINES & Co., EALING.

Stamp Portraits.

EXACTLY THE SIZE OF A POSTAGE STAMP, GUMMED AND PERFORATED.

25 for 1/0

100 for 2/6

500 for 9/0

50 „ 1/9

200 „ 4/6

1,000 „ 15/0

These prices are for Stamp Photos from one picture only (Cabinet preferable).
Special Quotation for larger quantities.

These Portraits can be supplied without the fancy margin, also not gummed or perforated.

PICTORIAL POSTCARDS (glossy or matt)

CONTACT PRINTS FROM PHOTOGRAPHERS' OWN NEGATIVES.
FROM ONE NEGATIVE.

Single print -/3, 12 do. 2/0, 25 do. 3/9, 50 do. 7/0, 100 do. 11/0, 500 do. 42/0

REGISTRATION and PURCHASE OF NEGATIVES

MADE FOR

CARBON OR PLATINOTYPE ENLARGING.

If Negatives are not registered they are cleaned off one month after order has been executed.

They may be registered for six months, or purchased right out at prices below.
Transparencies are retained for one year.

	Cab.	8½×6½	10×8	12×7½	12×10	15×12	17×10½	18×15	20×16
Registration	1/0	1/0	1/0	1/0	1/0	1/0	1/0	1/0	1/0
Purchase	1/0	1/3	1/9	2/6	2/6	3/0	3/6	4/6	5/6
	23×17	24×18	24×20	30×22	30×25	36×28	40×30	44×34	48×36
Registration	1/0	1/0	1/6	2/0	2/6	3/6	4/0	4/6	5/0
Purchase	6/0	7/0	8/0	10/0	11/6	17/0	24/0	30/0	40/0

MISCELLANEOUS.

	C. dev. and 4½×3½	5×4	Cabinet and ½-plate.	7×5	8½×6½	10×8	Panel.	12×10	15×12
Copying ... each	1/0	1/6	1/6	2/6	2/6	3/6	5/0	5/0	7/6
Developing } Films									
Intensifying } or									
Reducing } Plates									
Varnishing	1/0	1/0	1/6	1/6	2/0	2/6	3/0	3/0	4/0
Toning (Silver)	-/6	-/6	-/9	1/0	1/6	2/0	2/6	4/0	5/0
„ (P.O.P.)	-/9	-/9	1/0	1/6	2/0	3/0	3/6	5/0	6/0
Clouding	-/6	-/9	1/0	1/6	2/0	3/0	3/0	4/0	5/0
Enlarged Negs. ... each	2/0	2/6	2/6	3/6	4/0	5/0	6/0	6/0	8/6
Reduced Negs.	2/0	2/6	2/6	3/6	4/0	5/0	6/0	6/0	8/6
Transparencies	1/0	1/0	1/0	1/6	1/6	1/6	3/0	3/0	4/6
Opalines dozen	7/0	9/0	12/0	15/0	18/0	24/0	30/0	36/0	60/0

RAINES & Co., EALING.

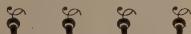
Specialities



IN BROMIDE . . . ENLARGEMENTS.

FROM GOOD ORIGINAL NEGATIVES—SINGLE FIGURES.

Groups extra according to number of subjects.



The "EALING."

ON PAPER.

Mounted on Best India Tint, Plate Sunk Mounts (faced with Plate Paper), and well finished in Monochrome

BLACK AND WHITE.

12 × 10 Enlargement	..	..	6/6
15 × 12	"	"	10/6
18 × 15	"	"	13/6
20 × 16	"	"	14/6
23 × 17	"	"	16/-
24 × 18	"	"	17/6
30 × 22	"	"	26/-

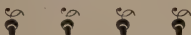
SEPIA TONED.

12 × 10 Enlargement	..	..	7/6
15 × 12	"	"	11/6
18 × 15	"	"	15/-
20 × 16	"	"	16/-
23 × 17	"	"	18/-
24 × 18	"	"	19/6
30 × 22	"	"	29/-

ON OPAL.

10 × 8 Enlargement	..	..	8/-
12 × 10	"	"	9/-
15 × 12	"	"	13/6
18 × 15	"	"	20/-
20 × 16	"	"	24/-
24 × 18	"	"	30/-

10 × 8 Enlargement	..	..	9/-
12 × 10	"	"	10/6
15 × 12	"	"	15/6
18 × 15	"	"	24/-
20 × 16	"	"	29/-
24 × 18	"	"	36/-



The "EALING" CIRCLES.

Bromide Enlargements mounted on Best Plate Sunk Mounts (faced with Plate Paper) with Circular India Tint and Plate Mark and well finished in Monochrome.

BLACK AND WHITE.

6 in. Diameter Enlargement	..	..	4/0
8 in.	"	"	5/6
10 in.	"	"	6/6
12 in.	"	"	8/6
15 in.	"	"	14/-

SEPIA TONED.

6 in. Diameter Enlargement	..	..	4/6
8 in.	"	"	6/6
10 in.	"	"	7/6
12 in.	"	"	9/6
15 in.	"	"	15/6

RAINES & Co., EALING.

Specialities in Bromide Enlargements.—*continued.*

The “EALING” OVALS.

Bromide Enlargements, mounted on Best Plate Sunk Mounts (faced with Plate Paper) with Oval India Tint and Plate Mark, and well finished in Monochrome.

BLACK AND WHITE.					SEPIA TONED.				
8½ × 6½	..	..	..	4/6	8½ × 6½	..	..	..	5/6
10 × 8	..	..	..	6/6	10 × 8	..	..	..	7/6
12 × 10	..	..	..	7/6	12 × 10	..	..	..	8/6
15 × 12	..	..	..	12/6	15 × 12	..	..	..	14/0



The “SEMI-TINT” (Bromide Enlargements).

Mounted on Best India Tint, Plate Sunk Mounts (faced with Plate Paper), the background and drapery being carefully finished in Black and White, and the flesh delicately worked in colours.

ON PAPER.					ON OPAL.				
12 × 10 Enlargement	..	..	..	12/6	10 × 8 Enlargement	..	..	..	12/6
15 × 12	..	..	..	16/-	12 × 10	..	..	..	15/-
18 × 15	..	..	..	21/-	15 × 12	..	..	..	20/-
20 × 16	..	..	..	23/-	18 × 15	..	..	..	26/-
23 × 17	..	..	..	25/-	20 × 16	..	..	..	30/-
24 × 18	..	..	..	27/-	24 × 18	..	..	..	35/-
30 × 22	..	..	..	37/-					

“Semi-Tint” Circles.

ON PAPER.				
8 in. Diam. Enlargement	..	..	..	10/-
10 in. ”	..	..	..	12/6
12 in. ”	..	..	..	15/-
15 in. ”	..	..	..	21/-

“Semi-Tint” Ovals.

ON PAPER.				
8½ × 6½ Enlargement	..	..	..	8/6
10 × 8	..	..	..	12/6
12 × 10	..	..	..	13/6
15 × 12	..	..	..	16/6

RAINES & Co., EALING.

SPECIALITIES—*continued.*



CARBON ENLARGEMENTS.

The “WARWICK.”

Mounted on Best India Tint Plate Sunk Mounts (faced with Plate Paper), and well finished in Monochrome.

These can be mounted on Best Plate Paper Mounts, Plate sunk, but without Tint if desired, but this should be distinctly stated when ordering.

ON PAPER.

12 X 10 Enlargement	..	..	14/-
15 X 12	..	..	17/6
18 X 15	..	..	22/6
20 X 16	..	..	25/-
23 X 17	..	..	27/6
24 X 18	..	..	28/6
30 X 22	..	..	44/-

ON OPAL.

10 X 8 Enlargement	..	..	12/-
12 X 10	..	..	14/6
15 X 12	..	..	18/6
18 X 15	..	..	27/-
20 X 16	..	..	31/-
24 X 18	..	..	38/-



PLATINOTYPE ENLARGEMENTS.

The “RANELAGH”

ON PAPER.

Mounted on Best India Tint Plate Sunk Mounts (faced with Plate Paper), and well finished in Black and White

12 X 10 Enlargement	..	..	..	..	14/-
15 X 12	..	..	..	..	17/6
18 X 15	..	..	..	..	22/6
20 X 16	..	..	..	..	26/-
23 X 17	..	..	..	..	30/-
24 X 18	..	..	..	..	32/-

Special Quotation for Extra Copies.

Half Tone & Line Blocks.

**HALF-TONE WORK
ON COPPER,**

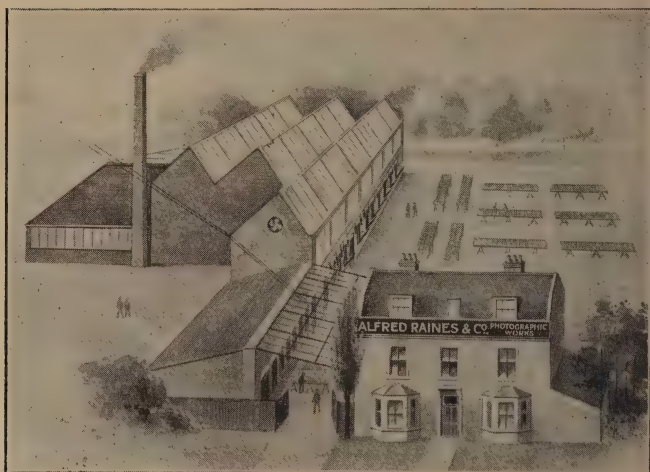
Fine, Medium or Coarse
Grain, 8d. per square inch ;
Minimum, 6/-.

*Vignetting, Routing, taking out Skies, Hand-engraving
&c., charged extra, according to time taken.*

LINE WORK.

ZINC, 4d. per square inch, minimum 4/-
COPPER, 8d. " " " " 6/-

SPECIAL QUOTATIONS FOR QUANTITIES.



GENERAL VIEW.

RAINES & Co., EALING.

GOLD MEDAL,
PARIS, 1900.

1903.



CATALOGUE ♦ ♦ ♦ ♦

of
the **N. & G. CAMERAS** ♦ ♦ ♦ ♦ ♦ ♦

AND OTHER PHOTOGRAPHIC
INSTRUMENTS + + + + + + + +

♦ ♦ ♦ Newman & Guardia Ltd.
90 & 92 Shaftesbury. ♦
♦ ♦ ♦ Avenue. London. W. ♦

(COPYRIGHT) ♦ ♦ ♦ ♦ ♦ ♦ ♦ ♦ ♦ ♦ ♦ ♦ ♦ ♦ ♦ ♦

'N. & G.' Publications.



A Romancer's Local Colour.—By S. R. CROCKETT.

A most interesting and amusing Article by this well-known Novelist and enthusiastic Amateur Photographer.

With 2 Original Sketches and 15 Photographs by the Author.

Price 1/6.

"I have had the good fortune to become the possessor of a little illustrated brochure by Mr. Crockett, which treats in the author's most delightful manner of *A Romancer's Local Colour*. Mr. Crockett jocosely lays bare the methods by which 'a fairly accurate and serviceably-indexed memory has been formed out of very imperfect materials.' His early beginnings were made with pen and pencil sketches as he tramped, over the hills and dales of his native country, and among several reproductions there is given the fountain-pen dot-and-dash drawing which served, while writing, to recall the grim Murder Hole in *The Raiders*. This method he found cumbersome, and the necessity for some better process and years of dabbling in the great "trouser-staining science" led him to adopt the Camera. Even this was a long and painful road to the perfect 'N. and G.' which for some time has been his most faithful servitor."—*London "Daily Mail"*



The 'N & G.' Camera in New Zealand.—

By ROBERT B. WALROND.

An instructive Account of the Author's Photographic Experiences.

With 13 artistic Illustrations Price 6d.



Catalogue of the 'N. & G.' Cameras, 1903, *Illustrated Edition*. Free.
 Instructions for Working the 'N. & G.' Cameras Price 3d.
 Descriptive Booklet of the 'N. & G.' Reflex Self-focussing Camera . . . Free.
 Descriptive Booklet of the 'Nydia' Pocket Camera Free.
 Price List of Selected Photographic Lenses Free.

NEWMAN & GUARDIA, L^{td}

**FACTORY :**

Pine Grove, Tollington Park, N.

**Telegraphic Address :**

'GONIOMETER, LONDON.'

Telephone :

P.O. Central, No. 3525.

OFFICE AND SHOW ROOM :**90 & 92, Shaftesbury Avenue, London, W.**

THE following description of the '**N. & G.**' **Cameras** will be found amply sufficient to enable Customers to select the most suitable Pattern for their favourite work, but enquiries and correspondence are always welcomed.

In addition to the Instruments included in this List we manufacture special apparatus for many other branches of Photography—like Kinematography, Projection, Photography in Natural Colours, Photomicrography, etc., particulars of which will be sent on application.

The high reputation of the '**N. & G.**' **Cameras** has for many years past secured us numerous orders to provide COMPLETE PHOTOGRAPHIC OUTFITS for Scientific and other Expeditions, both British and Foreign, as well as for private and official Research and Investigations of all kinds. The unique knowledge and experience we have gained in these departments is always freely at the disposal of our Correspondents. We are, in short, prepared to submit full information on and estimates for everything connected with Photography, from the minimum requirements of a Beginner to the complicated and varied installation of a Laboratory, or the equipment of an Exploring Expedition.

In all departments we supply nothing but **the best work obtainable**, as that invariably proves the cheapest in the long run, and is the only thing that can give satisfaction.

The '**N. & G.**' Instruments require, and receive, so much personal attention, that they are costly to make; the prices have, therefore, been cut as close as possible and do not allow of any reduction or discount. All Instruments bearing our name are made in London, at our own Factory and under our constant personal supervision. Every article is tested by competent experts, and nothing is allowed to leave our hands unless perfect in every detail, both as to workmanship and finish.

NEWMAN & GUARDIA, Ltd.



Terms.

All Prices are Strictly Net, for Cash with Order.

(Previous Catalogues, Price Lists, and Advertisements, where they differ from the present quotations, are hereby cancelled).

PACKING AND CARRIAGE are charged extra.

Unless otherwise instructed, Foreign orders are sent by Parcel Post, if possible; if too heavy for the post, by first Steamer, and packed in *tin-lined Cases*.

All goods are packed with the utmost care, and we cannot hold ourselves answerable for any damage they may sustain in transit.

Empties returned *are not allowed for*.

DEPOSIT ACCOUNTS.—For the convenience of Customers residing or travelling in the Country or Abroad, we undertake to send regular supplies of Photographic Materials, and any other goods they may require. For this purpose, and in order to save the expense of small remittances, we open Deposit Accounts for any desired amount.

EXTENDED PAYMENTS.—Any of our Instruments to the value of £10 and upwards, can now be obtained on a New Extended Payment System by monthly instalments. Particulars on application.

CORRESPONDENCE in English, French, German, and Spanish.

'N. & G.' Instruments are not sent on approval.



THE "N. & G." CAMERAS FOR HAND & TRIPOD.

Made in all
English and Continental Sizes
from $4\frac{1}{4} \times 3\frac{1}{4}$ to 7×5 inches.
For Plates, Cut Films, and
Film in Spools.

Seven Distinct Patterns.



THE 'N. & G.' CAMERAS are well-known as high-class Instruments, absolutely reliable, and capable of the finest work—whether artistic, scientific or general. They take any kind of Sensitive Material, and are as efficient and easy to use on a tripod as in the hand; and being, also, readily adapted for Wide-Angle, Telephotographic, and High-Speed Work, they are **Universal Instruments** which meet every requirement of photographers desiring to obtain perfect negatives under all sorts of conditions.

The 'N. & G.' Cameras were introduced as far back as 1891. As now made, they offer all the original features, which a long experience has shown to be indispensable, in combination with many additional improvements, which the steady progress of Photography has rendered possible. They hold the unique record of having been

Before the Public for Eleven Years,

and of giving the utmost satisfaction to thousands of Amateurs and Professionals who are using them in all parts of the World.

The principal considerations in the construction of the 'N. & G.' Cameras are perfection of workmanship and the utmost accuracy in all the adjustments. At the same time, the prices have always been kept as low as possible, and the Instruments will be found of exceptionally good value when their Completeness, Efficiency and Finish are considered.

The 'N. & G.' Cameras save their cost in plates, time, and trouble. They stand years of work in the most trying climates, and

never need repairs. Being very strongly made and of faultless workmanship, they resist accidents which would prove fatal to inferior apparatus.

Indispensable to Beginners because always ready for use, free from unnecessary complications, and extremely simple to work, they are **Used by the Leading Experts** because they take Lenses of any focal length, work with any Plates or Films, and *provide every Adjustment required in Photography.*



The 'N. & G.' System.



THE 'N. & G.' CAMERAS (see List page 18) are made in **Seven Patterns** to meet different requirements, but all are constructed on the same general lines. The following are the leading points of the '**N. & G.**' System:—

1. The Body and Front are built separately, and effectually conceal and protect the working parts. There are no projections of any kind.
2. All the parts are arranged in the most convenient position for Rapid Work, whether used in the Hand or on a Tripod.
3. Any Lens or different Lenses can be used, and all the patterns (except one) provide Double or even Triple Extension.
4. Every part (Shutter, Changing-box, Focussing Device, etc.) is highly efficient, and yet quite simple in construction.
5. There is at all times easy access to the working parts, for the purpose of cleaning, etc.
6. Every Adjustment can be made from the outside, so that the Camera need never be opened when in work, except for changing plates.
7. All the Friction Slides (Rises, Extension) are of metal, and capable of adjustment for wear. All the parts are detachable without removing the leather covering, and interchangeable.
8. All the materials employed are selected with the utmost care, many being specially prepared, and the workmanship is perfect throughout.
9. Every Camera is *specially made* for the Lens or Lenses selected by each customer. All Scales are accurately measured and engraved.

The Front is fitted to the Body by a slide, which allows it to be detached for cleaning, and gives the Vertical Rise.

Index Plate.—The bottom of the Front conceals the Index Plate; protects the Levers for setting the Shutter and the Iris Diaphragm, the Hand and Pneumatic Releases, etc.

Lenses.—Any Lens, or several Lenses can be used. They are fitted with the utmost care, and the centring and optical adjustments are rigorously tested.

The Iris Diaphragm is specially constructed; it cannot get out of order or wear shiny. The Scale of Apertures is measured and engraved for each Lens.

The Shutter is of high efficiency, yet simple in construction. It works between the combinations and is made *entirely of metal*. It is provided with *Hermetically Closed Pneumatic Regulation*, which ensures accuracy for years. It gives automatic exposures from $\frac{1}{2}$ to $\frac{1}{100}$ th second and "time" exposures at will. It works absolutely without noise, but its action *can be seen* from outside.

A Self-Capping Device works automatically *in front* of the Lens, and protects it from dust, spray, or other injuries. It also shuts off the light while the shutter is being set.

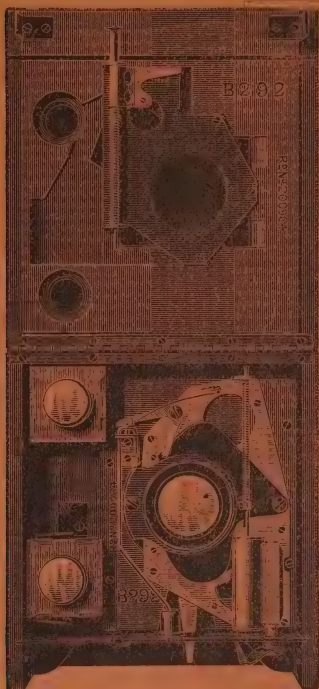
Focussing is effected by Central Rackwork which acts with the utmost smoothness and precision. The knob is *completely sunk* in the side of the Camera. The Scales are divided *by actual trial* for each Lens.

Screen.—Special facilities are provided for Tripod work. The back of the Camera forms a Dark Focussing Chamber and contains a strong Focussing Screen, the Frame of which is utilized for a variety of purposes.

Fittings.—The Instruments are complete in every respect and provided with special Finders and T-Levels for Horizontal and Vertical Pictures; Hand-sewn Leather Handle; Shoulder Strap; Tripod Screw and Bushes; Ball and Tube for Pneumatic Release, etc.

Case and Covering.—All woodwork is well-seasoned Mahogany and every board is clamped at both ends and cross-tongued. All joints are fitted and screwed together, and stand the most severe strains. All parts are covered with real Black Morocco selected for wear and appearance.

This thoroughness greatly increases the cost of manufacture of the '**N. & G.**' Cameras, but it ensures the necessary perfect adjustment of all parts, and complete rigidity after years of rough work.



**Back View of the same
Camera.**

With all the Doors opened, the Front raised, and the Ground Glass of the Focusing Screen removed.

Showing the Bag, Lifter, and Lock of the Changing-box, the Handle, the Setting Knob, etc., and (on the Lid of the Front) the Automatic Spring-door, the Self-cap, and the Finder Covers.

The...

'N. & G.' Cameras.



Front of a Pattern 'B' Instrument.

Opened to show the Shutter, the Lens and Mount, the Finders, the Index Plate with the Shutter-speed and Iris-Diaphragm Levers, the Pnéumatic Release, etc., and (on the Lid) the Self-cap and Hand Release, and the two Locking Springs.



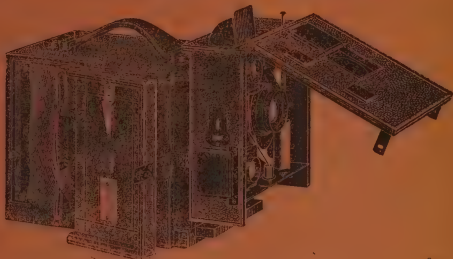
NEWMAN & GUARDIA, Ltd., 90 & 92, Shaftesbury Avenue, London, W.

The _____
'N. & G.' Cameras
 For Hand and Tripod.

GENERAL SPECIFICATION, which applies to all Patterns.



N. & G. Camera closed.
 Ready for work.



Open, to show Fittings and Movements.

SPECIFICATION.—Any Lens or Lenses; Iris Diaphragm; Automatic Self-Cap; Automatic Spring Door; Special High-efficiency Shutter, working between the lenses, made entirely of metal; hermetically closed Pneumatic Regulation, giving automatic exposures from $\frac{1}{2}$ to $\frac{1}{100}$ th second, and 'time' exposures at will; Hand and Pneumatic Releases. 'N. & G.' Detachable Changing Box for plates or films; two Special T-Levels; two 'N. & G.' Real Image Identical-View Finders; Special Focussing Screen; Central Rack and Pinion; Focussing Scale engraved from two yards to 'infinity.'

All woodwork well-seasoned Mahogany, every board clamped and cross-tongued; covered with Real Black Morocco of best quality obtainable. Special Wired Handle; Swivel Shoulder Strap; Tripod Screw and Bushes, etc.



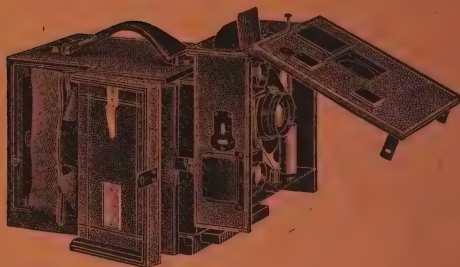
PATTERN A, the simplest of the 'N. & G.' Cameras, is exactly as per above specification, with the addition of a VERTICAL RISING FRONT. It is the cheapest *Complete* Camera in the market, and we strongly recommend it to Beginners.

For Size, Lenses and Prices, see List, page 18.

The _____
'N. & G.' Cameras
 For Hand and Tripod.

PATTERN B.

For General Specification see page 9.



PATTERN B has
in addition:

**Vertical & Horizontal
Rising Front, and
Double Extension.**

PATTERN B is a Camera similar in every respect to Pattern A, but adapted for a wider range of work. It combines great simplicity with the utmost efficiency; it is light and small.

The **Double Rising Front** will be found indispensable when photographing buildings, etc., and, in connection with the accurate Finders and Levels supplied, it renders architectural work quite easy.

With its **Double Extension**, Pattern B provides a power of still wider application. Lenses of considerable focal length may be used by its means; while, with the ordinary Lens, large heads can be taken, and flowers or any small objects may be photographed full size.



For Sizes, Lenses and Prices, see List, page 18.



*Strong Velvet-lined Leather Case, with best Lock and Fittings, $\frac{1}{4}$ -pl., 21/0;
 5×4 , 27/6. Soft Waterproof Cover, $\frac{1}{4}$ -pl., 5/6; 5×4 , 6/6.*

EXTRA FRONT for Wide-Angle Lenses (including alterations to
 Camera), $\frac{1}{4}$ -pl., 35/0; 5×4 , 45/0.

The
'N. & G.' Cameras
 For Hand and Tripod.

SPECIAL PATTERN B.



For General Specification, see page 9.

The Special Pattern B

has in addition:—

Vertical and Horizontal Rising Front,
 Extra Long Extension,
 Special Quick-Changing Flanges,
 Multiple Iris and Focussing Scales,
 and each Finder is marked for the different
 angles covered by the Lenses.



THE Special Pattern B Camera is our Standard Pattern, and the one we recommend and supply in nine cases out of ten.

It is the *beau idéal* of a perfect Universal Instrument. Though adapted for the most varied work, and for all kinds of Indoor and Outdoor Photography, it is simplicity itself in all its working details. Its all-round efficiency (long acknowledged to be superior to that of any other Camera, of any type) has been attained, not by cramming into it complicated adjustments difficult to master, but by the constant simplification and improvement of all its details, continued during many years, in combination with the most perfect adjustment of all its parts.

No Camera has been more thoroughly tried than this, none has stood years of hard work like the **'N. & G.' Special B.** Its sterling value and the high estimation it is held in by the public, is shown by the number we send every year to all parts of the world, and by the high price invariably realized when one is occasionally offered second-hand.

The **Special Pattern B** was designed to take full advantage of the Zeiss 'Double-Protar' Anastigmat Lenses, which we have always recommended, and still consider by far the best for general photographic work, combining as they do the highest degree of optical perfection with the power of using different focal lengths at will.

These features we have made the most of by fitting the Lenses to the **Special B** with the highest accuracy possible, and in such a way that the different Combinations can be instantly changed, by means of Special Automatic Flanges. Thus any of the foci of the particular Lens selected are always ready for use without loss of time; and separate Iris-Diaphragm and Focussing Scales are engraved for each focal length, the Finders being accurately marked for the different angles of view given.

In addition to the general features provided by the **Special B**, this Pattern is pre-eminently suited for the adaptation of Wide-angle and Telephoto Attachments, Accessories for Colour Photography, etc., etc. So that the possessor of a **Special B** soon finds that he has an Instrument perfectly fitted to take any and every kind of subject that presents itself, and one, that, invariably leading him to dispense with all other Cameras, soon saves its cost.

We stock the Camera in Two Forms:—

- 2-foci:** Fitted with a Zeiss 'Double-Protar' Lens, Series VIIa., No. 4, giving 5 in. at $f/6.3$, and 9 in. at $f/12.5$.
- 3-foci:** Fitted with a Zeiss 'Double-Protar' Lens, Series VIIa. No. 5, giving $5\frac{3}{4}$ in. at $f/7$, 9 in. and $11\frac{1}{2}$ in. at $f/12.5$.

The former is the neatest and lightest Camera we make, and its range of focus is amply sufficient for any but the most extreme work. The maximum aperture is $f/6.3$.

Size of $\frac{1}{4}$ -plate, $9 \times 5\frac{1}{8} \times 5\frac{5}{8}$ inches. Weight, complete, $4\frac{3}{4}$ lbs.

The latter is, of course, a more complete Apparatus as regards range of focus, and is to be preferred where many distant objects are likely to be met: as in Alpine, Marine Work, etc.

Size of $\frac{1}{4}$ -plate, $10\frac{1}{2} \times 5\frac{1}{8} \times 5\frac{5}{8}$ inches. Weight, complete, $5\frac{1}{4}$ lbs.

For Sizes, Lenses and Prices, see List, page 18.

Strong Velvet-lined Leather Case, with best Lock and Fittings, 2-foci, $\frac{1}{4}$ -plate, 21/0; 5×4 , 27/6. 3-foci, $\frac{1}{4}$ -plate, 25/0; 5×4 , 30/0. Soft Waterproof Cover, $\frac{1}{4}$ -plate, 5/6; 5×4 , 6/6.

EXTRA FRONT, for Wide-Angle Lenses (including alterations to Camera), $\frac{1}{4}$ -plate, 35/0; 5×4 , 45/0.



Work done with the **Special Pattern B**

‘N. & G.’ Camera.

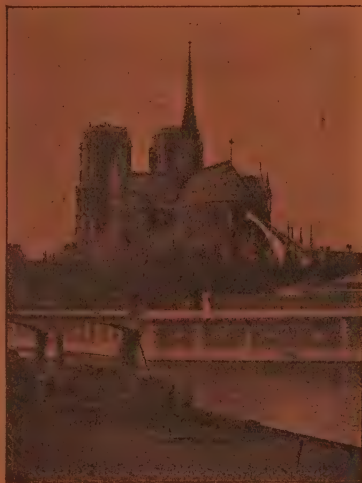
The two accompanying blocks, reduced from $\frac{1}{4}$ -plate negatives, taken from exactly the same spot, will give some idea of the power which the **Special B** places in the hands of the Photographer.

The many advantages of long-focus Lenses, must be evident to all experienced workers. It often happens that objects which to the eye seem of importance in a picture, are so far away from the Camera, that when photographed with lenses of the usual foci, they

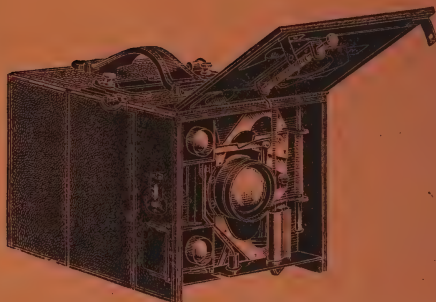
are quite insignificant in the resulting negative. Distant mountains, ships far out at sea, buildings across a river (as in the specimen selected) etc., have generally to be left untaken for this reason. Again, one is sometimes struck with a pleasing bit of composition, or by a bold effect of lighting, which cannot be satisfactorily reproduced by the lens of an ordinary Camera. If we attempt to take the scene from where we stand, the principal objects will be dwarfed, and the perspective distorted, while if we go nearer, to make the subject larger, the desired effect is entirely lost.

By means of the **Special Pattern B Camera**, all such subjects may be easily photographed the same apparent size and in the same relative proportions which they present to the eye.

The illustrations show the images of a 2-foci Camera. The 3-foci Instrument gives a third image, larger than in our second block; and, by means of additional Single Lenses, it can be made for almost any number of different foci.



The _____
'N. & G.' Cameras
 For Hand and Tripod.



H. S.
(High-Speed)
PATTERN.

For
 General Specification,
 see page 9.

The H.S. Pattern has
 in addition:

*Vertical and Horizontal Rising Front, Special Diaphragm Shutter,
 Focal-plane Shutter, working up to $\frac{1}{1000}$ th sec.*

RECENTLY INTRODUCED to provide an Instrument as perfect as possible for *High-Speed Work*, whilst retaining all the advantages of the "N. & G." System.

It is fitted with the new **Zeiss 'Planar,'** $f/3.8$, or **'Unar,'** $f/4.5$, **Lens**; a specially constructed **'N. & G.' Standard Shutter**, with fly-back Setting Rod, giving automatic exposures of from $\frac{1}{2}$ to $\frac{1}{100}$ th sec., and "time" at will; and, in addition, a **Focal-Plane Shutter**, adjustable for exposures of up to $\frac{1}{1000}$ th sec., with Speed Indicator, Hand and Pneumatic Releases, and Locking Device. The Shutters work quite independently of each other.

This Camera, owing to the high quality of its Lens, is perfect for *all-round Photography*, while for *High-Speed Work*, for which it has been specially designed, it is an ideal Instrument.

For Sizes, Lenses and Prices, see List, page 18.

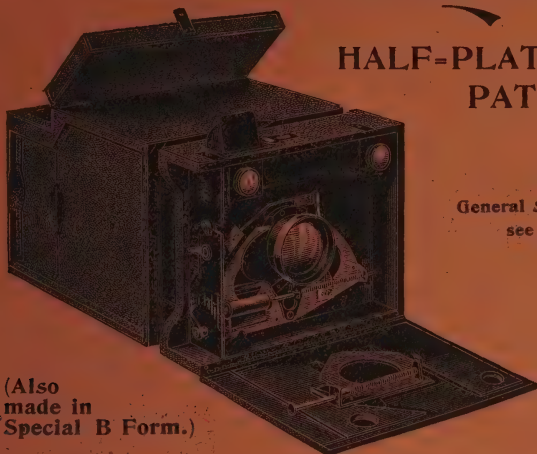
Strong Velvet-lined Leather Case, with best Lock and Fittings,

$\frac{1}{4}$ pl., 25/0; 5×4, 30/0.

Soft Waterproof Cover, $\frac{1}{4}$ pl., 5/6; 5×4, 6/6

The 'N. & G.' Cameras

For Hand and Tripod.



HALF-PLATE PATTERN

For
General Specification,
see page 9.

The
'Half-Plate'
Pattern
has, in
addition:—

(Also
made in
Special B Form.)

Vertical and Horizontal Rising Front, and Double Extension.

(The Shutter, Changing-box, and other Fittings are of special construction.)

THE Half-plate 'N. & G.' Cameras which we have supplied have proved highly successful. In order to meet the increasing demand for larger Cameras, we have given this pattern our special attention, and feel sure that it is as perfect and as easy to use as any of the other 'N. & G.' Instruments. The Shutter, even with an aperture of $f/6.3$, gives the full range of regulation: $\frac{1}{2}$ to $\frac{1}{100}$ th second automatic exposures, and 'time' exposures at will.

This pattern is made in two sizes—Half-plate ($6\frac{1}{2} \times 4\frac{3}{4}$ in.) and Double-Quarter ($6\frac{1}{2} \times 4\frac{1}{4}$ in.).

Note.—In order further to reduce the size and weight, Half-plate and Double-Quarter Cameras are usually made *shorter* than the full focal length of the Lens. Customers preferring their Cameras to be full infinity length (i.e., always ready at infinity) will please advise to that effect when ordering.

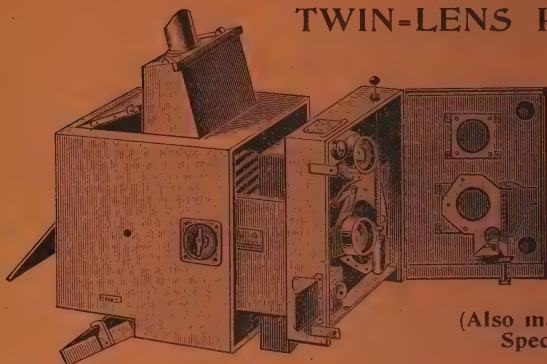
For Lens and Prices, see List, page 18.

*Strong velvet-lined Leather Case, with best Lock and Fittings,
Short Pattern, 30/0; Long, 35/0. Soft Waterproof Cover, 9/6.*

The 'N. & G.' Cameras

For Hand and Tripod.

TWIN-LENS PATTERN.



For General
Specification,
see page 9.

(Also made in
Special B Form.)

The Twin-lens Pattern has, in addition :—

*Horizontal Rising Front, Double Extension, two accurately paired Lenses,
'N. & G.' full-size image Focussing Device.*

THIS Camera has two Lenses, which, by careful adjustment, are made exactly coincident. The importance of seeing an exact duplicate of the image, not only up to, but even *during* the time the actual exposure is made, will at once be apparent.

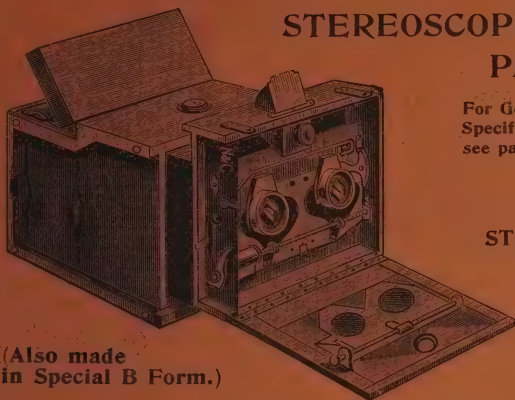
The '**N. & G.**' **Twin-Focussing Device** is well known. It is absolutely efficient in any light; it is quickly brought into use, and as rapidly made to disappear. Altogether, the '**N. & G.**' **Twin-Lens Camera** is the most complete and perfect Instrument the photographer could possess for the special work for which it is intended—animals and similar subjects at close quarters, and taken with large apertures.

For Landscape and General Work this Instrument is, of course, quite as efficient as the regular '**N. & G.**' Patterns, and it is the favourite Camera of many of our Leading Experts in spite of its necessarily larger size.

For Sizes, Lenses and Prices, see List, page 18.

*Strong velvet-lined Leather Case, with best Lock and Fittings : $\frac{1}{4}$ -pl., 30/0 ;
5×4, 35/0. Soft Waterproof Cover : $\frac{1}{4}$ -pl., 8/0 ; 5×4, 9/6.*

The
'N. & G.' Cameras
 For Hand and Tripod.



**STEREOSCOPIC
 PATTERN.**

For General
 Specification
 see page 9.

**THE
 STEREOSCOPIC
 PATTERN**

has,
 in addition :

(Also made
 in Special B Form.)

VERTICAL RISING FRONT, DOUBLE EXTENSION, TWO ACCURATELY
 PAIRED LENSES, DOUBLE SHUTTER, DOUBLE IRIS DIAPHRAGM
 AND DOUBLE SELF-CAP. $6\frac{1}{2} \times 4\frac{1}{4}$ CHANGING BOX.

THE Shutter, Iris Diaphragm, etc., naturally form the essential features of this pattern, and these have been proved to be perfect in every respect. No work, probably, requires such absolute perfection as Stereoscopic Photography, and the **Stereoscopic 'N. & G.'** always receives our utmost care and attention to details. The size of the plate adopted is the 'Double-Quarter,' $6\frac{1}{2} \times 4\frac{1}{4}$ in.; not only because it is eminently suitable for Stereoscopic pictures, but because, with the 'N. & G.' Changing Box, it is perfectly immaterial whether two ordinary quarter-plates are used or the $6\frac{1}{2} \times 4\frac{1}{4}$ in. plate. A point of the utmost importance with the '**N. & G. Stereoscopic Camera**' is that either 12 Stereoscopic Views or 24 Single Quarter-Plate Pictures may be taken. When using the camera for single Quarter-Plate exposures it is only necessary to close the right and left Spring-doors alternately. This Camera can be adapted for Double-Quarter, Quarter-Plate, or Stereoscopic work by having an '**N. & G. Half-Plate (Double-Quarter) Front**' fitted. The Septa of the bellows and Changing Box are made easily removable.

For Lenses and Prices, see List, page 18.

Strong velvet-lined Leather Case, with best Lock and Fittings, 30/0
Soft Waterproof Cover, 8/0.

List of the Patterns, Sizes, and Prices of the 'N. & G.' Cameras.

Patterns.	Size of Plate (inches).	LENSES.			
		Wray <i>f</i> /8.	Zeiss Anast. <i>f</i> /6.3.	Zeiss D.-Protar 2-foci.	Zeiss D.-Protar 3-foci.
A.	$4\frac{1}{4} \times 3\frac{1}{4}$	£13 10 0	£17 10 0	—	—
B.	$4\frac{1}{4} \times 3\frac{1}{4}$ 5×4	£15 0 0 18 0 0	£19 0 0 23 0 0	—	—
Special B.	$4\frac{1}{4} \times 3\frac{1}{4}$	—	—	£22 10 0	£24 0 0
	5×4	—	—	26 0 0	28 0 0
	$6\frac{1}{2} \times 4\frac{3}{4}$	—	—	32 0 0	35 10 0
H.S.	$4\frac{1}{4} \times 3\frac{1}{4}$ 5×4	} Zeiss Planar . . {		$5\frac{1}{2}$ ins. $6\frac{1}{4}$ "	£30 0 0 35 0 0
Half-Plate.	$6\frac{1}{2} \times 4\frac{1}{2}$ $6\frac{1}{2} \times 4\frac{1}{2}$	—	£28 10 0	—	—
Twin-Lens.	$4\frac{1}{4} \times 3\frac{1}{4}$	£21 0 0	£30 10 0	£37 10 0	—
	5×4	—	36 10 0	44 0 0	—
Stereoscopic.	$6\frac{1}{2} \times 4\frac{1}{2}$	Goerz, £32 0 0		£40 0 0	—

The 9×12 centimètre size is made in B, Special B, HS, and Twin-Lens Pattern and is sold at the same prices as 5×4 .

The following HIGH-CLASS LENSES are supplied:

For $4\frac{1}{4} \times 3\frac{1}{4}$ in.—Zeiss, Ser. II. No. 3, *f*/6.3 Anastigmat, $5\frac{1}{2}$ in. eq. focus, including original Mount and Iris Diaphragm.

Wray *f*/8 Rapid Rectilinear, $5\frac{1}{2}$ in. eq. focus, in special Cells.

For 5×4 in. and 9×12 cm.—Zeiss, Ser. II. No. 4, *f*/6.3 Anastigmat, $6\frac{1}{8}$ in. eq. focus, including original Mount and Iris Diaphragm.

Wray *f*/8 Rapid Rectilinear, 7 in. eq. focus, in special Cells.

For $6\frac{1}{2} \times 4\frac{1}{2}$ and $6\frac{1}{2} \times 4\frac{3}{4}$ in.—Zeiss, Ser. II. No. 5, *f*/6.3 Anastigmat, $8\frac{1}{4}$ in. eq. focus including original Mount and Iris Diaphragm.

Cameras with Zeiss 'Double-Protar' Lenses.

For $4\frac{1}{4} \times 3\frac{1}{4}$ in.—Ser. VIIa. No. 4. Foci, 5 and 9 ins;

or " " 5. " 5 $\frac{1}{2}$, 9 and 11 $\frac{1}{2}$ ins.

For 5×4 in. and 9×12 cm.—Ser. VIIa. No. 7. Foci, $6\frac{1}{2}$ and 11 $\frac{1}{4}$ ins;

or " " 8. " 7, 11 $\frac{1}{4}$ and 13 $\frac{3}{4}$ ins.

For $6\frac{1}{2} \times 4\frac{1}{2}$ and $6\frac{1}{2} \times 4\frac{3}{4}$ in.—Ser. VIIa. No. 10. Foci, 7 $\frac{1}{2}$ and 13 $\frac{3}{4}$ ins;

or " " 11. " 8 $\frac{1}{2}$, 13 $\frac{3}{4}$ and 16 $\frac{1}{4}$ ins.

(Including original Mount, with Iris Diaphragm).

ANY OTHER LENSES CAN BE FITTED TO ORDER.

Accessories

for



'N. & G.' Cameras.

Russia=Leather Bellows.—Strongly recommended for Tropical Climates, to protect Cameras from insects. Extra cost:—

Pattern B, $\frac{1}{4}$ -pl., 20/0; 5×4, 25/0. Special B, $\frac{1}{4}$ -pl., 2-foci, 20/0; 3-foci, 25/0. 5×4, 2-foci, 25/0; 3-foci, 30/0.

(Other Patterns in proportion.)

Aluminium Parts.

Extra cost of making the Index Plate and Finders in aluminium, to further reduce weight.

To any Camera, 15/0.

Aluminium Binding.

The metal is let into the woodwork, below the leather, imparting additional strength without increasing the weight.

Pattern B, or Special B, $\frac{1}{4}$ -pl., 40/0; 5×4, 50/0.

(Other Patterns in proportion.)

Extra Changing Boxes, Carriers, etc.

(See page 26 for full particulars and prices.)

Double Dark Slides.

Interchangeable with the Changing Boxes. For home use, and in all cases where only a few plates or films are required.

One Slide and Adapter . . . $\frac{1}{4}$ -plate, 17/6; 5×4, 21/0.

Set of 3 Slides and Adapter .. " 45/0; " 55/0.

Single Dark Slides.

For Half-plate, Double-quarter, and Stereoscopic Cameras, which will not take the Double Slides.

$6\frac{1}{2} \times 4\frac{1}{2}$ and $6\frac{1}{2} \times 4\frac{3}{4}$.. One Slide, 18/0; Set of Three, 50/0.

Roll Holders.

A special form of Eastman's Roll Holder for "daylight" Spools of rollable Film can now be supplied for use in 'N. & G.' Cameras.

$\frac{1}{4}$ -plate, 30/0; 5×4, 37/6. (Not made in $\frac{1}{2}$ -plate).

Re-fill Boxes, for Plates or Films.

Take 12 plates (or 24 films) in their Carriers, ready to replace the exposed material in the Changing Boxes. Perfectly light-tight; no other packing required.

With 1 doz. Plate Carriers.. $\frac{1}{4}$ -plate, 5/6; 5×4, 7/6; $6\frac{1}{2} \times 4\frac{3}{4}$, 10/6.

With 2 doz. Film Carriers .. " 9/6; " 12/6; " 18/0.

Improved "Eclipse" Changing Bag.

For changing in any light and without resorting to a dark-room.

$\frac{1}{4}$ -plate, 10/6; $\frac{1}{2}$ -plate, 12/6.

ACCESSORIES (continued).**"Celeritas" (high-speed) Shutter.**

A high-class Instrument for special work requiring very short exposures. It is made entirely of metal, works between the Combinations, and gives speeds of $\frac{1}{250}$, $\frac{1}{350}$ and $\frac{1}{500}$ th second.

Price, including making both the "Standard" and "Celeritas" Shutters detachable and interchangeable:—

For Lenses up to $\frac{3}{4}$ -in. aperture, £7 0 0; up to 1 $\frac{1}{8}$ in. aperture, £8 0 0.

Wide-Angle Front.

For taking difficult Architectural Subjects, Wide-Angle Lenses and this special Front are necessary. It takes the place of the ordinary Front of the Camera, but can be carried in the pocket when not in use.

Price, including alterations to Camera and Automatic Flange, $\frac{1}{4}$ -plate, 35/0; 5×4, 45/0; $\frac{1}{2}$ -plate, 55/0. (For Wide-Angle Lenses, see List, page 34.)

'N. & G.' Telephoto-Attachment.

For enlarging the image directly in the Camera. It can be fitted to all the 'N. & G.' Instruments, except Pattern A. It gives images $2\frac{1}{2}$ to 4 diameters larger than the normal Lens.

For $\frac{1}{4}$ -plate and 5×4, including 3 in. Dallmeyer Negative and marking Camera, £6 0 0. Leather Pocket Case, 6/6.

'N. & G.' Enlarger.

A Simple Instrument for making Whole-plate Prints from Quarter-plate Negatives. It is always ready and in focus, and admits of adjustment for subjects out of perpendicular, etc. Complete with R.R. Lens, Dark Slide for Plates or Paper, Shutter, Focussing Screen, Tripod Screw and Bush.

For $\frac{1}{4}$ to $\frac{1}{2}$ -plate, £4 15 0 For 5×4 to 10×8, £6 0 0.

(For more complete Enlarging and Reducing Cameras, see pp. 28-30.)

Focussing Glasses.

Indispensable for focussing accurately on the ground glass; for examining negatives, etc.

Small achromatic Eyepieces brass, 5/6; nickelled, 6/6

Long form, folding Glass. (Projects through the back of an 'N. & G.' Camera) brass, 12/6

Zeiss' Aplanatic Glass. (Gives a perfectly flat and sharply defined image) aluminium, 26/0

Pocket Cases 1/6

Air-Tight Metal Cases.

Very light, but strongly made of double thickness iron, enamelled black. Closing hermetically; with rubber joints, iron clamp, and lock. Indispensable for preserving Leather and Wood in hot and damp climates.

For B, Special B, or H.S. Cameras and Leather Cases:

$\frac{1}{4}$ -plate, 30/0; 5×4, 35/0; $\frac{1}{2}$ -plate, 45/0.

ACCESSORIES (continued).**'N. & G.' Eiffel Stand.**

A remarkable combination of Rigidity and Lightness. The best Tripod for small Cameras. Will stand any climate. Two-fold rigid Legs.
 No. 1, height, 4 ft. 9 in.; size, closed, $30\frac{3}{4} \times 1\frac{1}{2} \times 1\frac{1}{4}$ in.; weight, $1\frac{1}{4}$ lbs.
 No. 2, height, 4 ft. 9 in.; size, closed, $30\frac{3}{4} \times 2 \times 1\frac{1}{8}$ in.; weight, $1\frac{3}{4}$ lbs.
 Price, with Waterproof Cover, No. 1, 27/6; No. 2, 30/0
 Extension Piece for use with 'N. & G.' Cameras 7/6

Three-Fold Stands—For workers who require a Tripod folding into a smaller space than the above. Three-fold sliding Legs.

No. 1, height, 4 ft. 1 in.; size, closed, $19\frac{1}{4} \times 1\frac{3}{4} \times 1\frac{1}{2}$ in.; weight, $1\frac{1}{2}$ lbs.
 No. 2, height, 4 ft. 10 in.; size, closed, $26 \times 2\frac{1}{2} \times 2$ in.; weight, 3 lbs.
 Price, with Straps No. 1, 15/6; No. 2, 21/0

'N. & G.' Naturalist's Stand.

Specially designed to facilitate the photography of Natural-History Objects, Books, Pictures, and small Curios with 'N. & G.' Cameras. The objects are held on a *horizontal* tray and need not be fixed, and the Camera is pointed vertically downwards.

For A, B and Special B $\frac{1}{4}$ -plate Instruments, Price 42/0.

(Larger Sizes in proportion.)

N. & 'G.' Telemeter.

A little Instrument for measuring the distance to any object with accuracy, and without attracting attention. It is made of Aluminium, and measures $1\frac{5}{8} \times 1\frac{1}{8} \times \frac{1}{8}$ in.

Price, with Leather Case and Instructions, 1/6.

'N. & G.' Actinometer.

An Exposure Meter, utilizing Watkins' Patent System of measurement. It is made by ourselves, on a new design. Size, only $1\frac{3}{8} \times \frac{5}{8}$ in. Can be fitted flush into woodwork of Camera, or carried in the pocket.

Price, with Pocket Case and Instructions, 20/0 each. Re-fills, 6d. each. Fitting to 'N. & G.' Camera, 5/0.

'N. & G.' Isochromatic Screens.

For correctly rendering the different tints of a Landscape, and for photographing coloured objects of all kinds. They can be placed on the lens like a cap.

Best quality "Ray Filters": Exposure, $\times 2$, or $\times 4$: $\frac{1}{4}$ -pl., 8/6; 5×4 , 10/6
 Holders 2/6

Second quality "Screens," in brass Mount $\frac{1}{4}$ -pl., 5/6; 5×4 , 6/6
 Pocket Cases $\frac{1}{4}$ -pl., 2/0; 5×4 , 2/6

Straps for Carrying 'N. & G.' Cameras.

Best Hand-sewn Leather Straps, $\frac{1}{2}$ -in. wide, with Brass Swivels (as supplied with $\frac{1}{4}$ -plate Instruments), 2/6.

Broad Canvas-Webbing Sling, 2-in. wide, with hand-sewn Leather Ends, and Steel Swivels (as supplied with 5×4 and larger Instruments), 5/6. Extra Long Sling, 6/6.

Set of Broad Canvas-Webbing Knapsack Straps, to attach to the Leather Case of the Camera. Complete with Fittings, 7/6.

The 'N. & G.' REFLEX SELF-FOCUSSING CAMERA

For Hand and Tripod.

**Takes Plates, Cut Films or
Daylight Spools.**

**A Perfect Instrument
containing many new Features.**

ALTHOUGH for all-round work high-class, scale-focussing Cameras, like the 'N. & G.' Special Pattern B, will always be preferred by many, there has ever been a great demand for Self-focussing Instruments, which, in addition to other important advantages, *do away with the difficulty of estimating distances.*

This demand has so far only been adequately met by 'Twin-Lens' Cameras, which, however, are necessarily bulky, and often present other structural drawbacks. While the alternative method of automatic focussing, the 'Reflex' Principle, has not hitherto been successfully applied, because these Cameras entail the use of a Focal-plane Shutter, which, as generally made, does not give the slower exposures which are so often wanted in practice, and cannot be worked without noise and vibration. Attempts to render this Shutter available for a greater range of work, by making the slit adjustable, have so far only resulted in making the Cameras as bulky and complicated, while in many respects less efficient, than a good Twin-Lens.

In the construction of the '**N. & G.**' Reflex we have aimed to produce, not a cheap substitute for the Twin-lens, but as perfect a Single Lens Self-focussing Camera as a careful study of the Reflex Principle on its own merits would allow. The result is a Camera of the highest quality, in which all the leading points of the well-known '**N. & G.**' System are offered in combination with all the essential features of the Reflex Principle in a highly improved and entirely new form.

The cost has been kept as low as the great amount of work entailed by the construction of such an Instrument would allow, and in comparing the price with that of previous Reflex Cameras the high quality and efficiency of every detail, and the degree of completeness and number of unique features of the '**N. & G.**' Reflex must be taken

into account. It is a Reflex Camera which *can* be relied upon to work as perfectly after many years of use as on the first day—the only real guide to the value of a Camera intended for Serious Workers.



The Focal-plane Shutter of the '**N. & G.**' Reflex is constructed to give the normal range of exposure, which is found necessary for well-exposed negatives in all-round work, in addition to the highest speeds of which this type of Shutter is capable. It gives automatic exposures of $\frac{1}{10}$, $\frac{1}{25}$, $\frac{1}{50}$, $\frac{1}{100}$, $\frac{1}{200}$, $\frac{1}{400}$, and $\frac{1}{800}$ th second; and the alteration of speed is instantly effected by opening or closing the slit of the blind *from the outside*.

For 'Time' and prolonged exposures a detachable Pneumatic Release is provided.

The tension of the springs is never altered, so that exposures are always constant. The Shutter cannot be over-wound, and cannot, therefore, be broken. It works perfectly noiselessly and is quite free from vibration.

There are no complications: one single Knob serves to set the Shutter and alter the speed. The exposures are not estimated according to width of slot, but *accurately tested for each Shutter*. The Shutter, while giving a much greater range of exposure than the ordinary Focal-plane, is yet neater and smaller, thus enabling us to make a Reflex which is no larger or heavier than an ordinary Hand Camera. Further, the Shutter has been made *easily detachable* and interchangeable, so that, should the Blind at any time fail to work through the rubber perishing owing to an unsuitable climate, it can be easily replaced, and a new Shutter can be substituted at a moment's notice.

The Reflector, which in previous Instruments has given rise to so much trouble, owing to vibration, noise and shaking up the dust in the Camera, has been constructed on an entirely new principle, which ensures its smooth and noiseless working. It can be actuated in three ways: *Hand Release* (for exposures of $\frac{1}{10}$ th to $\frac{1}{800}$ th), by raising the Reflector by Hand. *Finger Release* (for exposures of $\frac{1}{10}$ th to $\frac{1}{800}$ th), by just pressing a Button in the usual way. *Detachable Pneumatic Release* either for Shutter exposures or for 'Time' exposures of any duration. All Releases work quite noiselessly and are free from vibration.

The Reflector is protected by a new Spring Hood, which enables one to see the Image with perfect ease and *in any light*. It is quickly brought into use and as rapidly made to disappear.

The '**N. & G.**' Reflex has an exceedingly long range of focus—from 'infinity' to 1 foot—and it enables one to photograph *anything*, from a distant Range of Mountains to a small Natural History Subject *full size*, with perfect ease and absolute sharpness.

It provides an ample Rise of Front both for Horizontal and Vertical Pictures. It can be fitted with any Lens or Lenses of suitable focus and size. An '**N. & G.**' Changing-box for 12 plates or 12 films (or for 24 films); a Separate Focussing Screen for home or studio work; a detachable Auxiliary Finder; two T-levels, and all the usual Sundries of the best '**N. & G.**' Cameras, complete the Instrument, which is covered with real Black Morocco, and has the highest workmanship and finish throughout.

We stock the '**N. & G.**' Reflex Camera fitted with a Zeiss Ser. VIIa. No. 7 'Double-Protar' Anastigmat Lens and scaled for both foci— $6\frac{3}{8}$ in. at $f/6.3$ and $11\frac{3}{8}$ in. at $f/12.5$, which we consider the best and most suitable Lens for the Instrument.

While for Landscape and General Work this Apparatus is as perfect as the best Hand and Tripod Camera, for difficult subjects such as Animal and Figure Studies at close quarters, Portraiture, etc., it offers many unique advantages. It is the best Camera for Beginners, and others who for any reason find it difficult to estimate distances or to use the Scale of an ordinary Hand Camera. And Artistic Workers who prefer to use their Lens with *large apertures*, and all who like to see a *Full Size, Brilliant and Unreversed Image* of the Picture they are taking, will find the '**N. & G.**' Reflex indispensable.

Size, only $10\frac{5}{8} \times 5\frac{5}{8} \times 6\frac{1}{2}$ in. Weight, $6\frac{1}{4}$ lbs.

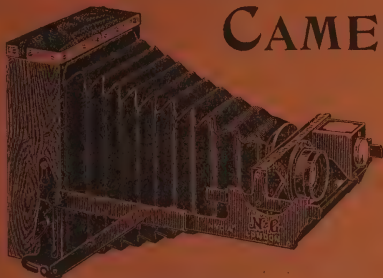
(Both including the Lens, Changing-box and extra Focussing Screen.)

Price of '**N. & G.**' Reflex Camera, for Quarter-plate Pictures, complete with Zeiss Ser. VIIa. No. 7 'Double-Protar' Anastigmat £35 0 0

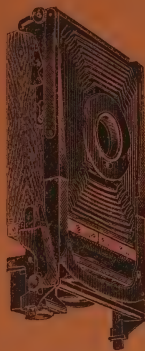
Price of Camera without Lens, but including cost of fitting Customer's own Lens (if suitable) 25 10 0

The 'Nydia'

POCKET CAMERA.



'NYDIA' OPEN.



CLOSED.

Takes 12 Quarter-plate Pictures on Films
(or 8 on Plates). Exceedingly light and portable,
quickly set up, rigid, and absolutely self-contained.
Focussing from 2 yards to 'infinity.'
A Good Lens. A Perfect Shutter.
The Highest Finish Throughout.
Size, closed, $7\frac{1}{2} \times 4\frac{1}{2} \times 1\frac{1}{2}$ inches.
Weight, loaded, under 1 $\frac{1}{4}$ pounds.



THE demand for a portable but efficient Hand Camera is as old as "instantaneous" photography itself. That this demand has not hitherto been fully met, is evident from the regret invariably expressed by writers on the subject, that they have not—and cannot get—any easily concealed apparatus with which to secure satisfactory pictures, *without sacrificing either size or quality.*

When out for the express purpose of picture hunting, the serious worker always prefers to use a full-sized rigid-body Camera, containing all the movements and adjustments necessary to deal with any and every kind of subject. But he quite as often longs for an instrument, less complete, perhaps, which, being unnoticeable in bulk and shape, he could *always* take with him, and thus be able to secure those charming "bits" of life and scenery which always seem to come upon us when we least expect them.

The beginner too, before reaching a stage of knowledge sufficiently great to appreciate the advantages of an instrument costing £20 or £30, dreams of a Camera the use of which he can learn at once, which he can literally carry "in his pocket," and which, while costing a moderate sum, may yet enable him to produce good work.

When, therefore, we were able last year to place in the market a new form of the 'Nydia'—an old favourite, the manufacture of which we were compelled to discontinue owing to the ever-increasing demand for the 'N. & G.' Cameras—it was enthusiastically welcomed, and the large numbers already sold have given the greatest satisfaction.

The new 'Nydia,' while embodying the leading features of the original type, which have stood six years' trial, has undergone so many improvements, that it is really an entirely new Camera. The quality and finish are up to 'N. & G.' standard; the low price, for so complete an instrument, being due solely to the use of special machinery for many of its parts.

While the 'Nydia' is in no way expected to compete with instruments of a more universal application like the 'N. & G.' Cameras, it is second only to these, and, as will be seen by the description and illustrations, for general photography, *i.e.*, for Landscape, Sea Pictures, Street Scenes, Groups, Architecture, and all kinds of Artistic Work, it is as perfect a Camera as can be made.

We recommend the 'NYDIA' as a really efficient Pocket Camera—new in many details, but thoroughly tried in its essential features—capable of producing the finest work, taking full-size Quarter-plate Pictures on either films or plates; light and portable to a degree never before attained, and yet quickly set up, rigid, absolutely self-contained, and having no loose parts.

It is an indispensable addition to the outfit of an Expert; the simplest and safest apparatus for a Beginner; and the only practical type of Camera for the Cyclist.



Specification of Quarter-plate 'NYDIA.'

Lens (as selected), full $5\frac{1}{2}$ -in. focus; Iris Diaphragm; new Self-capped high-efficiency Shutter, working between the Combinations, made entirely of metal; Pneumatic Regulation, giving automatic exposures from one-half to one-hundredth second, and "time." Special Detachable Changing Box ('N. & G.' System) for twelve Films, or eight Plates or Films, with automatic Index. Reversible Finder for vertical and horizontal pictures. Focussing Scale engraved from 2 yards to "infinity." Swing Back.

Wood-work, finest seasoned Mahogany. Metal parts, Brass, black-bronzed, and German silver, throughout; all interchangeable and easily replaced. Strong Leather Case with Shoulder-strap.

Specification of Half-plate 'NYDIA.'

Lens, 8-in. focus; new Self-capped high-efficiency Shutter, giving automatic exposures from one-half to one sixty-fourth second, and "time." Rising Front. Level—and all other parts as above.

"This really beautiful little Camera by Newman and Guardia, referred to in our pages last week, may now be described at greater length, and so receive the publicity it really deserves. . . . The 'NYDIA' strikes one at once as a most exquisite specimen of constructive skill, whilst apparently none of its efficiency as a practical Camera is sacrificed to mere ingenuity in minimizing size or weight. . . . we can unhesitatingly style the 'NYDIA' as quite one of the most beautifully fashioned, yet most completely efficient instruments we have had the pleasure to inspect, and in every way worthy of the admitted reputation of its makers."—THE AMATEUR PHOTOGRAPHER.

"This Camera is beautifully made, and is a perfect specimen of Camera construction. It is small enough to easily fit into the pocket, and is thoroughly efficient both for time and instantaneous work. It is further completed by a good swing back that enables one to use it for architectural work."—THE PHOTOGRAPHIC NEWS.



'NYDIA,' as per Specification, Complete with one Box and Leather Case.

	Quarter-pl.	Half-pl.
1. Fitted with 'Nydia' <i>f</i> /8 R.R. Lens . . .	£7 10 0	
2. The same, with <i>Beck</i> <i>f</i> /8 R.R. Lens . . .	£8 8 0	—
3. The same, with <i>Ross</i> <i>f</i> /8 Sym. Anastigmat	£10 0 0	£19 5 0
4. The same, with <i>Zeiss</i> <i>f</i> /6.3 'Double-Protar'	£15 10 0	£25 10 0

(The case of Nos. 3 and 4 is velvet lined and fitted with cycle straps).

Also made in 5 × 4 and Stereoscopic Size

(Particulars on application).

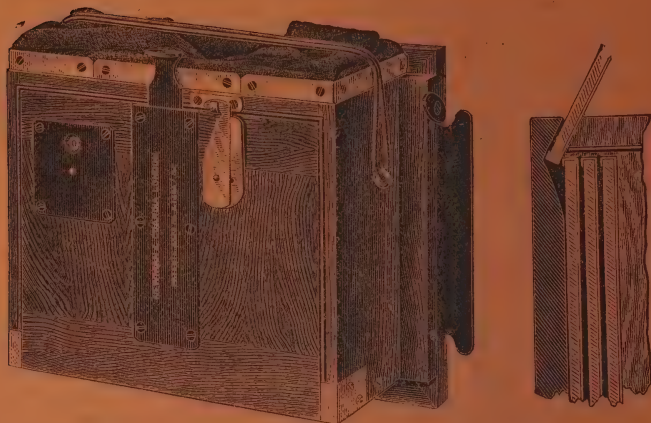


Accessories.

	Quarter-pl.	Half-pl.
Rising Front , obtained by swinging both the front and the back of the 'Nydia' . . .	£0 17 6	(included)
'NYDIA' Changing Boxes (interchangeable), complete with Carriers and Bellows, each	£2 15 0	£4 15 0
Russia-Leather Bellows , recommended for Tropical Climates . . . extra cost, per Box	£1 1 0	£1 10 0
Tripod Board for holding the 'Nydia' on a stand, with 'N. & G.' screw	£0 7 6	£0 10 6
Pneumatic Release (detachable) for the 'Nydia,' with Ball and Tube	£0 5 6	£0 5 6
Special T-Level for horizontal and vertical pictures	£0 4 6	(included)
Roll Holders. A special form of Eastman Roll Holder for Daylight Spools (interchangeable with the 'Nydia' Changing Boxes) each	£2 10 0	£3 10 0

The 'N. & G.' Changing Boxes

For using Plates or Cut Films
in Field or Hand Cameras.



THE success of the '**N. & G.**' Changing Boxes (as used in the '**N. & G.**' Cameras) has been so great that no photographic outfit can now be considered complete without them. They are readily detachable, and each taking 12 plates, or 24 films, the number of exposures a photographer can make (especially in connection with the '**N. & G.**' Refill Boxes and Changing Bag) without returning to a dark-room is practically unlimited. Thousands of '**N. & G.**' Changing Boxes of all sizes have been sold, and during the *Eleven Years* they have been in the market in their present form, not one has been known to fail. The quality of the materials employed, and the workmanship of all the parts, have been brought to the highest degree of perfection, and they are steadily superseding the bulky and awkward dark slide for field work, and the complicated and unreliable 'automatic changing' devices in Hand Cameras. The Boxes are made in two patterns:—

A, cut to the smallest dimensions, for use in the '**N. & G.**' and other Hand Cameras.

B, with a large front, which can be easily cut down to fit the reversing back of any Field Camera, or Hand Cameras made for Dark Slides.

Either pattern is made in

Two Forms.

No. 1 contains 12 carriers to take Plates of any thickness. These are made of thin steel, and are not only very light but exceedingly strong. A corrugation at each end of the Carrier prevents any scratching of the sensitive surface. By means of 12 Film Holders, supplied with every box, cut Films may also be used in the above Carriers. This, indeed, is the only method of keeping cut films absolutely flat during exposure, for they are firmly held all round the four sides.

No. 2 contains 24 specially thin Carriers, for Cut Films only. With these Carriers no Holders are necessary.

(Boxes Nos. 1 and 2 are not interchangeable as regards the Carriers, *i.e.* Boxes No. 1 will only take 12 Films, and Boxes No. 2 take no plates. But the Boxes are interchangeable with each other in the Camera, and are also interchangeable with the Daylight Roll Holders and Double Dark Slides).

A point of the utmost importance in all the 'N. & G.' Carriers is that the *sensitive surface* of the plates or films comes in contact with the register of the Box; the varying thickness of the different materials used is, therefore, of no consequence.

Using an 'N. & G.' Changing Box is the only way to avoid pin-holes and double exposures—the two greatest troubles of the photographer.

The aluminium **Spring Partition** contained in each box always keeps a steady pressure on the Carriers, both in front and behind, and prevents the plates from rattling. The edges of the plates touch nothing but steel.

An automatic **Index** constantly indicates the number of Exposures made.


Changing Boxes.

			Plate Carriers. Film Holders. Film Carriers.	
			For Boxes Nos. 1 or 2. Per Dozen.	
Size.	Outside Measurements.	Price each. Pattern A or B.	Steel.	Aluminium.
$4\frac{1}{4} \times 3\frac{1}{4}$ in.	$4\frac{3}{4} \times 4\frac{1}{2} \times 2\frac{1}{2}$ in.	45/0	4/0	6/6
9 × 12 cm.	133 × 122 × 63 mm.	55/0	5/0	8/0
5 × 4 in.	$5\frac{1}{2} \times 5\frac{1}{4} \times 2\frac{1}{2}$ in.	55/0	5/0	8/0
$6\frac{1}{2} \times 4\frac{1}{4}$ in.	$7\frac{1}{8} \times 5\frac{1}{2} \times 2\frac{1}{2}$ in.	75/0	7/6	15/0
$6\frac{1}{2} \times 4\frac{3}{8}$ in.	$7\frac{3}{8} \times 6 \times 2\frac{3}{8}$ in.	75/0	7/6	15/0

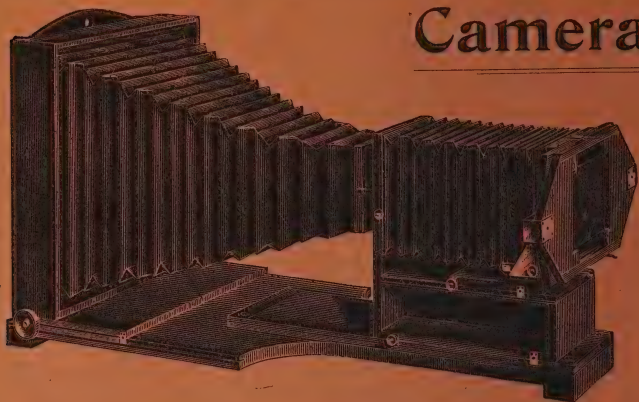
Any other size to order.

Strong Velvet-lined Leather Cases, with Shoulder Strap and Lock.

For Boxes, Pattern A. $4\frac{1}{4} \times 3\frac{1}{4}$, 10/0; 5 × 4, 12/0; $6\frac{1}{2} \times 4\frac{3}{8}$, 15/0.
 " " B. $4\frac{1}{4} \times 3\frac{1}{4}$, 12/0; 5 × 4, 15/0; $6\frac{1}{2} \times 4\frac{3}{8}$, 17/6.

The 

'N. & G.' Enlarging Camera.



THE 'N. & G.' ENLARGING CAMERA is a high-class instrument which enables the worker to Enlarge, Copy, or Reduce his negatives without loss of time, and with a certainty of perfect results. It will enlarge from $\frac{1}{4}$, 5×4 , and $\frac{1}{2}$ -plate negatives or transparencies up to 15×12 in., and will reduce down to lantern slide size— $3\frac{1}{4} \times 3\frac{1}{4}$ in. The instrument is made of blackened Mahogany, and is of the most perfect workmanship and finish throughout; it is, in fact, like the 'N. & G.' Cameras, made entirely by hand and carefully adjusted.

DESCRIPTION.—The 'N. & G.' Enlarging Camera consists of a strong Baseboard, supporting at one end the special apparatus for holding and adjusting the negatives, a 15×12 in. Camera at the other end, and the Lens and Shutter-board in the centre. All these parts are connected by means of strong Bellows; no light can, therefore, enter the Camera except through the negative.

Negative Holder.—The front part of the Camera consists of a square frame of wood, attached to the Bellows, and pivoted between strong metal supports. This frame takes the Negative Holder; it can be swung backwards and forwards, and thereby provides adjustment for correcting lines out of perpendicular in vertical or horizontal pictures. The Negative Holder is readily detached from the Camera.

It consists of two frames, held together by strong springs, but which can be moved one upon the other in any direction. The outer frame holds the negative to be reproduced, and a ground-glass screen for diffusing the light, if necessary. The inner frame carries the cut-out masks determining the *shape* of the picture. It is only necessary to insert the two pins projecting from this inner frame into corresponding slots in the Camera front, in order to fix the Holder firmly in position.

Either the whole or any part of the picture may be reproduced, and any detail thus selected (by sliding one frame over the other) will be *automatically centred*.

Lens and Shutter.—The Lens and Negative Holder travel together along the Baseboard, and can be clamped in any position. Any Lens from $\frac{1}{4}$ to $\frac{1}{2}$ -plate size may be used. The Shutter is actuated from outside the apparatus by turning the knob over the Lens-board clamp. It works smoothly and without vibration.

Dark Slides.—Single 'Solid' Slides of special construction are used with the '**N. & G.**' **Enlarging Camera.** The Shutter pulls right out, and the back is detachable. The Slides will take Plates for *Enlarged Negatives* or *Transparencies*, or Bromide Paper for *Direct Enlargements*. For holding paper absolutely flat, a sheet of Plate Glass and a Backing Board are supplied with each Camera.

Focussing.—A separate ground-glass Focussing Screen is provided, and the Camera is fitted with Rack and Pinion for focussing.

The '**N. & G.**' **Enlarging Camera** can be used either with daylight or artificial light. Daylight is preferable on account of its power and convenience. For *Artificial Light* an Extension Piece can be fitted to the Camera, to carry a Condenser and the source of light. With either method of working this Instrument will produce Large Pictures equal, and in some respects superior, to prints from negatives of the same size taken direct.

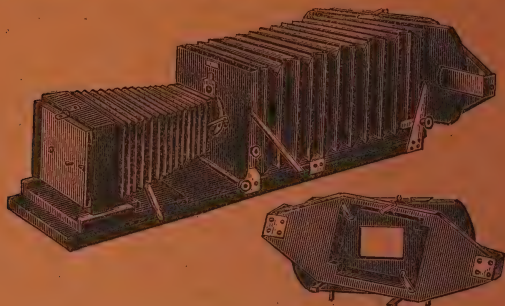


PRICE of the Apparatus for Enlarging from $\frac{1}{2}$-plate to 15×12, with one 15×12 Dark Slide, two extra Carriers for enlarging from $\frac{1}{4}$-plate to $\frac{1}{2}$-plate, and Focussing Screen				£13 10 0
Zeiss Ser. IIa., No. 2, Anastigmatic Lens, $f/8$ (the best for Enlarging)	..	..	..	4 15 0
Extra 15×12 Dark Slides, with plate glass	..	..	each	2 10 0
Extra Plate Carriers	..	..	..	0 6 6
Extra Negative Carriers	..	..	..	0 6 6

Attachment for Artificial Light, including $5\frac{1}{2}$ in. Condenser, Incandescent Gas Jet with Aluminium Cover, and Baseboard				5 5 0
The same with $8\frac{1}{2}$ -in. Condenser	..	..	..	8 0 0

THE

'N. & G.' LANTERN-SLIDE REDUCING CAMERA.



THE 'N. & G.' REDUCING CAMERA is an instrument every detail of which has been carefully considered and constructed to attain the object in view—the production of technically perfect Slides with a minimum of trouble.

This apparatus, as regards its general design, is practically a miniature of the 'N. & G.' Enlarging Camera. It reduces $\frac{1}{4}$ -plate (or $\frac{1}{2}$ -plate) to $3\frac{1}{4} \times 3\frac{1}{4}$. Any Lens of about $5\frac{1}{2}$ in. equivalent focus may be used; with a $5\frac{1}{2}$ in. Lens the entire image may be reduced to half the size, or any small detail enlarged up to two diameters.

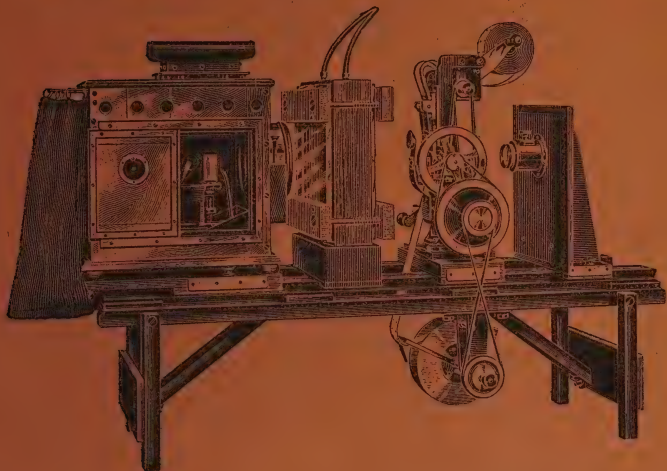
The **Negative Holder** is detachable, and provides *universal adjustment* of the negative in any plane. The **Dark Slides** are particularly neat, and convenient to use. A lever for fine focussing, a **Focussing Screen**, a **Shutter** working without the slightest vibration, and all the necessary fittings are supplied.

Daylight, or any artificial light, may be employed for reducing with this Camera; the former, however, is to be preferred. All the adjustments are easy, and the Camera is exceedingly light and small, and may be placed anywhere. These features render the production of Lantern Slides, by means of the 'N. & G.' Camera, a perfectly simple and delightful occupation.

Price of the Apparatus for Reducing from $\frac{1}{4}$ -plate, with one $3\frac{1}{4} \times 3\frac{1}{4}$ in. Dark Slide, and Focussing Screen ..	£4 10 0
The same, for reducing from $\frac{1}{2}$ -plate	5 10 0
Zeiss Ser. IIa., No. 2, Anastigmatic Lens, $f/8$ (the best for Reducing)	4 15 0
Extra Dark Slides each	0 7 6

Attachment for Artificial Light , including $5\frac{1}{2}$ -in. Con- denser, Incandescent Gas Jet with Aluminium Cover, and Baseboard	5 5 0
The same, with $8\frac{1}{2}$ -in. Condenser	8 0 0

THE 'N. & G.' KINEMATOGRAPHIC INSTRUMENTS.



The **'N. & G.' Kinematographic Instruments** are now well-known, and have won among Experts the same high position for quality, efficiency and excellence of construction, which the **'N. & G.'** Hand Cameras have long held in the estimation of the General Photographic Public.

While their small size, neatness, and ease of manipulation, have rendered the **'N. & G.' Kinematographic Instruments** so thoroughly adapted to the requirements of Amateurs, the unique technical advantages they offer, the absolute reliability of all their working parts, and their ready adaptation to all kinds of work, appeal in the strongest manner to the Professional Worker anxious to possess *the best of everything*.

Many **'N. & G.' Kinematographic Instruments** have now been in daily, or nightly, use for years, without failing under the most trying circumstances and without showing signs of wear under constant work, and we can confidently recommend them to all those who wish to produce Kinematographic Films, as technically perfect as the best ordinary Photographs, or to project "Animated Pictures" as bright and steady as Lantern Slides on Glass.

THE 'N. & G.' KINEMATOGRAPHIC INSTRUMENTS

(continued).

The 'N. & G.' Kinematograph Camera.

High efficiency System, allowing the use of small Lens apertures, and giving good results even with badly-lighted subjects.

Complete with best f/5.6 Anastigmatic Objective; Automatic Counter recording the progress of the exposure, and Indicator showing the passage of the film. Automatic Winder; Finder and Focussing Eyepiece; Daylight Changing System of outside Bobbins. Capacity of Bobbins, 100 to 500 feet of Film without reloading. Best design and workmanship throughout; wearing surfaces of steel and adjustable; Case of well-seasoned Mahogany, covered with black Morocco. Complete with three 100 ft. Bobbins.

Size, $8\frac{1}{2} \times 5\frac{1}{2} \times 9\frac{1}{2}$ in. Weight, 8 lbs.

Price, £30 0 0

Practically as portable and quite as easy to work as a $\frac{1}{2}$ -plate Hand Camera.

Extra Strong "Eiffel" Stand for same.

Absolutely rigid, yet portable. Weight, $6\frac{1}{2}$ lbs.

£2 0 0

The 'N. & G.' Film Printing Machine.

Self-contained light-tight Apparatus. Can be used in an ordinary room with any kind of Artificial Light. Absolute Contact between Negative and Positive assured. The progress of Printing can be seen from outside. Allows for the varying shrinkage of the Negative. Very simple to work and quite automatic in action. Complete with Stand, forming also a Packing Case for the mechanism and a light-tight Receptacle for the exposed Film.

£20 0 0

Can easily be adapted for any System of Perforation or Gauge.

The 'N. & G.' Kinematograph Projector.

High efficiency System, allowing 85 % of the available Light to reach the Screen, and giving an image quite free from flicker.

Never wears out the Positives, as the coated surface does not come in contact with any part of the Machine, and there is no tension on the Film. Works practically without noise, at any rate of speed. Any make of standard $\frac{1}{8}$ in. Film can be used. Takes spools of up to 1000 feet of Film. Complete with Lantern, Condenser, 'N. & G.' Oxy-hydrogen Jet, best Projection Lens on interchangeable baseboard, and Automatic Winder.

£35 0 0

Film Developing and Washing Apparatus.

A very convenient and time-saving device. By its use, Films up to 100 feet may be developed as easily and almost as quickly as glass plates. Cannot damage the sensitive surface. Economises solutions, and ensures uniform development, perfect fixing, and thorough washing. Made of well-seasoned waterproofed wood. With one Drying Cylinder.

£15 15 0

Sundries.

Film Perforating Machines for any System or Gauge. Negative or Positive Film, Aluminium Bobbins, Plain and Damp-proof Tins, etc. Perforating, Printing and Developing.

Contents.



	PAGE.
Publications	2
Terms	4
'N. & G.' Cameras—	
General Description	5-8
General Specification	9
Pattern B.....	10
Special Pattern B	11-13
H. S. Pattern	14
Half plate Pattern.....	15
Twin-lens Pattern	16
Stereoscopic Pattern.....	17
General List	18
Accessories—	
Special Fittings	19
Dark Slides	19
Roll Holders	19
Refill Boxes.....	19
Changing Bag.....	19
High-Speed Shutter	20
Wide-Angle Front.....	20

	PAGE
Accessories (<i>continued</i>)—	
Telephoto Attachment	20
$\frac{1}{4}$ - $\frac{1}{8}$ plate Enlarger	20
Focussing Glasses	20
Air-tight Cases	20
Tripods	21
Naturalist's Stand	21
Telemeter	21
Actinometer.....	21
Isochromatic Screens	21
Carrying Straps	21
The 'N. & G.' Reflex ..	22-24
The 'Nydia'	25-27
Changing Boxes.....	28-29
Enlarging Camera.....	30-31
Reducing Camera	32
Kinematographs.....	33-34



NEWMAN & GUARDIA, LTD.,

90 & 92, Shaftesbury Avenue, LONDON, W.

**GOLD MEDAL,
Paris, 1900.**



Telegraphic Address:

"GONIOMETER, LONDON."

Telephone:

"P.O. CENTRAL, No. 3525."

**NEWMAN &
GUARDIA, Ltd.,
90 & 92,
SHAFTESBURY
AVENUE,
LONDON, W.**



Telegrams : "SQUEEGEE, LONDON,"

Telephone : 1009 HARLESSEN.

xxx

FOR . .

Carbon

Tissues,

Enlargements,

Frames,

&c.,


WRITE TO .

Thomas Illingworth & Co.,
LTD.,

THE PHOTO WORKS,

WILLESSEN JUNCTION,

LONDON, N.W.

See following pages, 



ILLINGWORTH'S

CARBON TISSUES

(T.I.C. BRAND).

We have pleasure in submitting herewith Prices of our Celebrated "Horse-Shoe" brand of Carbon Tissues and Materials.

The indisputable superiority of these Tissues is justified—

By their **RICHNESS,**

By their **LARGE VARIETY OF COLOURS,**

And by their **REMARKABLE KEEPING QUALITIES ;**

it is therefore with every confidence that we recommend these goods, and solicit your kind orders.

	In any Colour	Transparency Tissue.	Photogravure Tissue in Three Colours.
INSENSITIVE:			
Per band 12-ft. long, 30-in. wide ...	6/6	8/6	12/6
" $\frac{3}{4}$ " 9 " 30 " ...	5/0	6/6	9/6
" $\frac{1}{2}$ " 6 " 30 " ...	3/6	4/6	6/6
" $\frac{1}{4}$ " 3 " 30 " ...	2/0	2/6	4/0
" band 12 " 36 " ...	7/6	—	—
SENSITIVE:			
Per band 12-ft. long, 30-in. wide ...	7/6	9/6	15/0
" $\frac{3}{4}$ " 9 " 30 " ...	6/0	7/6	11/6
" $\frac{1}{2}$ " 6 " 30 " ...	4/0	5/0	8/0
" $\frac{1}{4}$ " 3 " 30 " ...	2/6	3/0	4/6

Also in cut pieces at popular prices

SPECIAL DISCOUNTS TO LARGE BUYERS.

See following pages.

ILLINGWORTH & CO., LTD.



TRADE MARK.

ILLINGWORTH'S . . .

Single Transfer Papers

(Forming the support of Carbon Prints by the Single Transfer Process.)

The following is the largest assortment of Transfer Papers ever submitted by any manufacturer; the list contains Papers of all Surfaces and in Different Tones.

No. 104—	Medium Thickness	for ordinary work, per band 12-ft. × 30-in.	2/9
No. 105—	Thick	for large work, per band 12-ft. × 30-in.	3/0
No. 109—	Willesden Crayon ,	white matt grain, per band 12-ft. × 30-in. ...	3/6
No. 110—	Fine White Rives	for small work, per band 12-ft. × 30-in. ...	4/0
No. 112—	Toned Matt	for small work, per band 12-ft. × 30-in.	3/6
No. 115—	Fine White	for small work, per band 12-ft. × 30-in.	3/0
No. 108—	Toned Etching ,	per band 12-ft. × 30-in.	3/9
No. 108—	Toned Etching	in sheets, 30 × 22	9d.
No. 111—	White Etching ,	per band 12-ft. × 30-in.	3/9
No. 111—	White Etching	in sheets, 30 × 22	9d.
No. 113—	Whatman's Rough	in sheets, 30 × 22... ..	1/0
No. 111—	White Hand Made	in sheets, 30 × 22	1/0

Double Transfer Final Support.

(In Two Shades—Azure and Opal.)

No. 100—	Medium Thickness ,	per band 12-ft. × 30-in.	3/0
No. 101—	Fine Thin White Rives ,	per band 12-ft. × 25½-in.	4/6
No. 102—	Fine White	for small work, per band 12-ft. × 30-in.	3/6
No. 103—	Toned Matt ,	per band 12-ft. × 30-in.	3/9
No. 106—	Toned Smooth ,	per band 12-ft. × 30 in.	3/9
No. 114—	White Matt ,	per band 12-ft. × 30 in.	3/9
No. 107—	Toned Whatman ,	per band 12-ft. × 30 in.	5/0

And in cut pieces at popular prices.

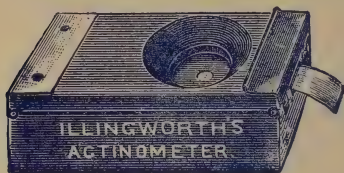
See following pages.

ILLINGWORTH & CO., LTD.

ILLINGWORTH'S ACTINOMETER

FOR CARBON PRINTING.

Guaranteed never to get out of Register. Gives $\frac{1}{4}$, $\frac{1}{2}$, $\frac{3}{4}$, and whole Tints.



The cheapest and most convenient Instrument for testing the printing of Carbon Tissues.

In two qualities,

3s. and 2s. each.

Permanent Spotting Colours.



These Colours are strongly advised to be used for "finishing" Enlargements made on our Tissues or for Spotting Prints.

In Porcelain Pans in the following colours:—

Brown	Sepia	Sea Green
Purple	Red Chalk	Terra-Cotta
Black	Dark Blue	Warm Sepia

Price 6d. per Pan.

Carbon Printing Frames.



Special Deep Frames, with Double Hinged Bars made to our own design, and used in our own works, with Plate Glass and Felt Pads complete.

	each.		each.
9 x 7	10/-	16 x 13	15/-
11 x 9	11/-	19 x 16	25/-
13 x 11	12/-	21 x 17	27/-

See following pages.

ILLINGWORTH & CO., LTD.

Bromide

Enlargements.



ILLINGWORTH

& Co., Ltd.,

OF

Willesden Junction

LONDON,

N.W.,

Have for the last Ten years been known as the

PROFESSIONAL PHOTOGRAPHERS'

Enlargers. They are, without doubt, the

CHEAPEST HOUSE IN THE TRADE.

THEIR RESULTS ARE GUARANTEED THE BEST.

Prices and Discounts only to —————

Professional Photographers and Dealers

See following pages.

ILLINGWORTH & CO., LTD.

ILLINGWORTH'S



Carbon . . .

Enlargements



. ON .

Paper & Opal

Are produced from Negatives made by the WET
COLLODION Process, which is the only method
which obtains the . .

Rich Juicy Prints

. . so much desired



Full Illustrated Price Lists with pleasure from—

THOS. ILLINGWORTH & Co., Ltd.,

The Photo Works,

Willesden Junction,

LONDON, N.W.

See following pages.

FINISHING OR PAINTING ENLARGEMENTS.



The painting of Enlargements, in Black and White, Monochrome, Water Colours, or Oils, is a special feature of our business, and **our staff of artists is unrivalled** in the trade.

Backgrounds, figures, or any other matter introduced into pictures, or any artistic work undertaken.

We finish Enlargements, in any process, at List prices, or, if preferred, we finish them **TO ANY GIVEN PRICE**, and guarantee **THE UTMOST VALUE.**

SPECIAL LINES

Suitable to all classes of business.

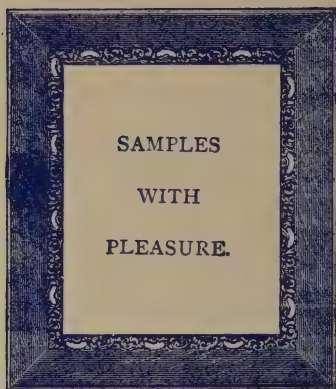
Please Write for Price List. . . .

*. . . We have always **SOMETHING NEW.***

See following page.

ILLINGWORTH & CO., LTD.

ILLINGWORTH'S Frame Department.



We hold a very
large stock of the
highest class

AMERICAN . . .

and

GERMAN . . .

MOULDINGS. . .

Having been in the trade so long we
know how to

Frame

— Pictures —

Artistically.

And we shall be happy to send patterns, prices,
and our advice gratis. Please write.

See preceding pages.

ILLINGWORTH & Co., Ltd., Willesden Junction, N.W.

ERNEST
WESSON & Co.,

Paper Importers,

Photographic Mount
Manufacturers,

Die Sinkers, and
Relief Stampers,

122, Regent Street,
London, W.

100, Mark Lane, London, E.

ERNEST WESSON & CO.,

Paper, Engraving and Penographic Mount
Manufacturers.

Stock the
Highest Quality Mounts
of every description in
White, Cream and Tellowish
colours:-

Scotch Grey, Steel Grey,
Dark Grey, Sage, Nut
Brown, Chocolate, Ivy Green,
Steel Black, etc., etc.

This Paper is a Sample of
STEEL BLACK.

Size 12 x 44. Thin.

It is so strong and tough that it can be used for either
Sepia or Black, and any
other Carbon print.

Samples and Price List on application.

122, Regent Street, London, W.

ERNEST
WESSON & Co.,

Paper Importers,

Photographic Mount
Manufacturers,

Die Sinkers and
Relief Stampers.

122, Regent Street,
London, W.

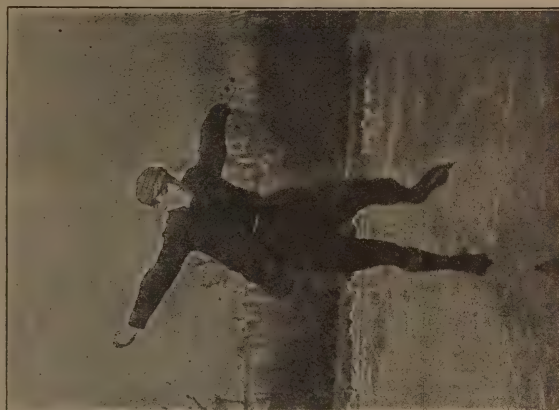
Factory:

129, Vinland Street, Soho, W.



VICIOUS!

Taken by Mr. T. WALLIS with a No. 2 "Penna."
Exposure $\frac{1}{800}$ second.



THE "MOHAWK" (Figure Skating).

Taken in Mid-winter with a No. 1 "Penna" by Mr. R. WICKSTEED.
Exposure $\frac{1}{800}$ second.




SCREEN OF CHAPEL IN ASHTON CHURCH, DEVONSHIRE.

Taken by Mr. H. LEE with a No. 2 "Penna," fitted with a Pneumatic Release.

**JUMPING THE NET.**

Taken by Mr. T. WALLIS with a No. 2 "Penna."
Exposure $\frac{1}{800}$ second.

THE 

“Penna” Focal

Plane Camera

HAS THESE ADVANTAGES:—

It gives exposure from $\frac{1}{8}$ th to $\frac{1}{1000}$ th of a second.

It gives “Time” exposure as easily as any small shutter working on the lens.

It shows the speed at any moment marked clearly in fractions of a second.

No calculations are required to arrive at the speed.

All movements are regulated from the outside.

All working parts are securely cased in.

All motions are of the simplest character, and there is nothing complicated to get out of order.

It is neat in appearance, small in size, and cheap in price.

It possesses a first-class lens.

Prices of No. 1 “Penna,” complete, with R.R.

lens and 3 dark slides, from **£6 12 6**

Prices of No. 2 “Penna,” complete, with

Beck Steinheil lens and 3 dark slides, from **£10 10 0**

SEND FOR PRICE LISTS OF
CAMERAS, DARK SLIDES, SHUTTERS, &c.

POST FREE FROM

WALLIS BROS.,

Stamford Road Works, KETTERING.

"OPTIMUS"

(REGISTERED TRADE MARK).

ABRIDGED CATALOGUE

OF

Photographic

Optical and

Scientific

Apparatus.

MANUFACTURED BY

Perken, Son & Co., Ltd.,

99, HATTON GARDEN,

LONDON, E.C.

ESTABLISHED 1852.

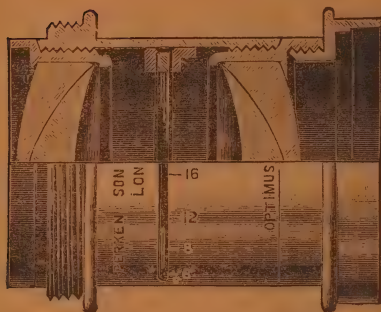
TELEGRAPHIC ADDRESS—"OPTIMUS."

TELEPHONE-CENTRAL 4515.

"OPTIMUS"

Improved Extra Rapid F.6

EURYSCOPE LENSES.



THESE Lenses are so constructed that notwithstanding their extreme rapidity they give excellent marginal definition. They are especially useful for hand camera work, whilst the larger

sizes are invaluable for portraiture and large groups.

The following prices are for Lenses mounted in brass and fitted with either Iris or Waterhouse Diaphragms.

ENGRAVED SIZE	5 × 4	6 × 5	7 × 5	8 × 5	9 × 7	10 × 8	12 × 10
FOR PLATES							
Inches	4½ × 3½	5 × 4	6½ × 4½	7 × 5	8½ × 6½	10 × 8	12 × 10
Centimetres...	—	12 × 9	—	18 × 13	—	24 × 18	30 × 24
EQUIV. FOCUS							
Inches	5½	6½	8½	10	12	14	18
m/m	140	165	222	253	304	355	456
PRICE ... £	3:3:0	3:18:0	4:14:6	5:10:0	6:6:0	9:10:0	14:10:0

Either combination of the above lenses can be used separately.

PERKEN, SON & CO., LTD., 99, Hatton Garden, Holborn Viaduct, **LONDON.**

"OPTIMUS"

Wide Angle F. 9.50

EURYSCOPE LENSES.



THE aperture of these Lenses is exceedingly open for wide angle work. The definition is, however, in no way sacrificed, and the series of lenses will be found of great value for instantaneous work in confined situations, and also for photographing dark interiors, the amount of light admitted by the lens enabling the operator to focus objects sharply on the screen, whereas with a lens of less aperture to focus sharply would be an impossibility.

The following prices are for lenses mounted in brass and fitted with rotating stops.

ENGRAVED SIZE	5 × 4	7 × 5	9 × 7	10 × 8	12 × 10
FOR PLATES					
Inches... ..	4½ × 3½	6½ × 4½	8½ × 6½	10 × 8	12 × 10
Centimeters	9 × 12	16 × 12½	21 × 15	24 × 18	30 × 24
EQUIV. FOCUS					
Inches... ..	4	6	7½	9½	12
m/m	101	152	190	240	304
PRICE £	3:3:0	4:14:6	6:6:0	9:10:0	14:10:0

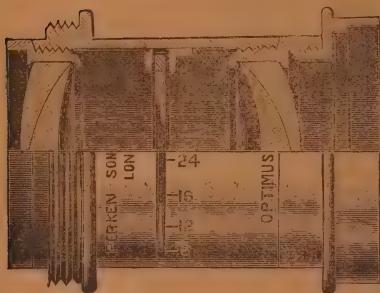
Either combination of the above lenses can be used separately.

PERKEN, SON & CO., LTD., 99, Hatton Garden, Holborn Viaduct, **LONDON.**

"OPTIMUS"

Improved Rapid F.8

RECTILINEAR LENSES.



THIS series of Lenses is capable of doing all general photographic work.

They are specially useful for Buildings, Landscapes, etc., and Portraiture is also within their capabilities. Their work may be styled universal.

The following prices are for Lenses mounted in brass and fitted with either Iris or Waterhouse Diaphragms,

ENGRAVED - SIZE ...	5×4	6×5	7×5	8×5	9×7	10×8	12×10	15×12	18×16
FOR PLATES									
Inches ...	4½×3½	5×4	6½×4½	7×5	8½×6½	10×8	12×10	15×12	18×16
Centimetres	—	12×9	—	18×13	21×15	24×18	30×24	33×27	40×30
EQUIV. FOCUS									
Inches ...	5½	6½	8½	10	12	14	18	20	25
m/m ..	140	171	225	254	304	355	456	506	633
PRICE	£1 16.0	2 10.0	2 16.0	3 10.0	4 0.0	5 5.0	6 0.0	7 5.0	9 5.0

Either combination of the above Lenses can be used separately.

PERKEN, SON & CO., LTD., 99, Hatton Garden, Holborn Viaduct, **LONDON.**

"OPTIMUS"

Wide Angle F.16

SYMMETRICAL LENSES.



THIS series of Lenses has been specially constructed for Photographing in confined situations—such as interiors of Buildings, and for taking lofty Architectural subjects. It is also eminently suitable for copying, and the reproduction of Plans, Maps, etc.

The following prices are for Lenses mounted in brass and fitted with rotating stops.

ENGRAVED SIZE ...	5×4	7×5	9×7	10×8	12×10	15×12	18×16
FOR PLATES							
Inches ...	4½ × 3½	6½ × 4½	8½ × 6½	10 × 8	12 × 10	15 × 12	18 × 16
Centimetres ...	12 × 9	18 × 13	21 × 15	24 × 18	30 × 24	33 × 27	40 × 30
EQUIV. FOCUS...							
Inches ...	3½	5	7	9	11	13	16
m/m ...	89	127	178	228	279	330	406
PRICE ... £	2:2:0	2:18:0	4:0:0	5:5:0	6:0:0	7:5:0	9:5:0

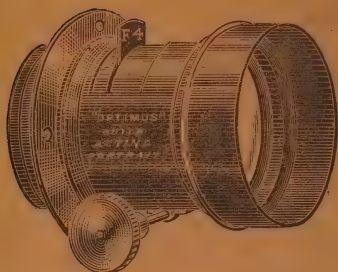
Either combination of the above Lenses can be used separately.

PERKEN, SON & CO., LTD., 99, Hatton Garden, Holborn Viaduct, **LONDON.**

"OPTIMUS"

Quick-Acting **F.4**

PORTRAIT LENSES.



SPECIALLY constructed as quick acting for short exposures in Portraiture. They are second to none in excellence of definition and brilliancy of results.

Diam.	2 inches.	2½ inches.	3½ inches.
Price	£4:10:0	£6:0:0	£9:0:0
C. de V.	1.B	Cabinets 2.B	Grand Cabinets 3.B

Optimus Stereoscopic Lenses.

Covering $3\frac{1}{4} \times 3\frac{1}{4}$

F.16, Wide Angle, per pair...	£3:0:0
F. 8 Rapid Rectilinear, per pair ...	£3.10:0
F.6 Rapid Euryscope „ ...	£6:0.0

These Lenses are most carefully matched and are fitted with Iris Diaphragms.

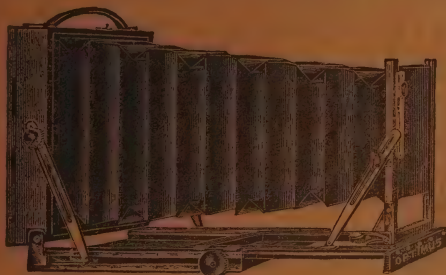
A Stereoscopic between Lens Shutter can be fitted to above at an extra cost of £2 15 0

PERKEN, SON & CO., LTD., 99, Hatton Garden, Holborn Viaduct, **LONDON.**

"OPTIMUS"

Improved Wide Angle

TAPER BELLOWS CAMERA.



THIS Camera is of the very best workmanship and finish, it is exceedingly light but possesses all the rigidity of the heavier instruments

Every movement of utility to the expert photographer is possessed by this camera, and it will be found in every way satisfactory.

The following prices include camera and three double dark slides.

Sizes in Inches.	Prices.	Extra for turntable in base and 3-fold stand.	Brass Binding Extra.	Extra Double Dark Slides	Extension in Inches.
	£ s. d.	£ s. d.	£ s. d.	£ s. d.	
4½ × 3½	6 0 0	1 10 0	1 7 6	14 0	11
5 × 4	6 6 0	1 10 0	1 8 0	14 6	13
6½ × 4½	7 5 0	1 15 0	1 10 0	15 0	15½
8½ × 6½	8 8 0	1 15 0	1 12 0	1 1 6	19
10 × 8	11 10 0	2 0 0	1 13 0	1 5 6	21
12 × 10	13 18 0	2 5 0	1 18 0	1 11 6	26
15 × 12	16 14 0	2 15 0	2 8 0	2 7 6	33
18 × 16	25 10 0	3 5 0	3 5 0	3 0 0	40

PHOTOGRAPHIC OUTFIT. — Comprising above Camera and three double dark slides, Optimus Rapid Rectilinear Lens, Time and Instantaneous Roller Blind Shutter with speed indicator and waterproof case complete.

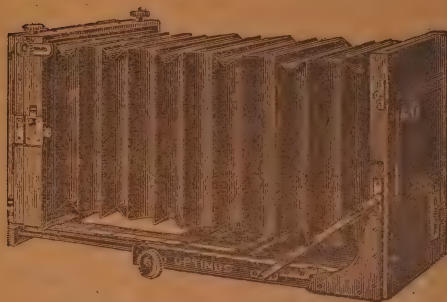
4½ × 3½	5 × 4	6½ × 4½	8½ × 6½	10 × 8	12 × 10	15 × 12
£10	£11	£12	£15	£20	£26	£31
Extra cost of Rapid Euryscope Lens in place of Rapid Rectilinear is						
4½ × 3½	5 × 4	6½ × 4½	8½ × 6½	10 × 8	12 × 10	
27/-	27/-	37/-	46/-	78/-	150/-	

PERKEN, SON & CO., LTD., 99, Hatton Garden, Holborn Viaduct, **LONDON.**

"OPTIMUS"

Parallel Bellows

LONG FOCUS CAMERA.



THIS Camera is extensively used by professional photographers, and for rigidity strength, and general convenience cannot be surpassed. The front is rigid and will support the heaviest lenses. The extension is by rack and pin on or by endless screw, and when closed the baseboard protects the focussing screen.

The Camera being frequently used in the studio a repeating frame is arranged to take the place of the reversing frame, and thus two pictures on one plate can be taken. The cost of this is extra as shown below.

Sizes in Inches.	Prices.	Brass Binding Extra.	Extra Double Dark Slides.	Repeating Frame.
	£ s. d.	£ s. d.	£ s. d.	£ s. d.
4½ × 3½	6 10 0	1 7 6	14 0	—
5 × 4	6 13 0	1 8 0	14 6	—
6½ × 4½	6 17 0	1 10 0	15 0	1 15 0
8½ × 6½	8 15 0	1 12 0	1 1 6	2 5 0
10 × 8	11 17 0	1 13 0	1 5 6	2 15 0
12 × 10	14 10 0	1 18 0	1 11 6	3 5 0
15 × 12	16 15 0	2 8 0	2 7 6	3 15 0
18 × 16	25 10 0	3 5 0	3 0 0	4 5 0

For **Stereoscopic Work** extra cross front and central division are supplied at an extra charge of 10/-

PHOTOGRAPHIC OUTFIT.—Comprising above Camera and three double dark slides, Optimus Rapid Rectilinear Lens. Time and Instantaneous Roller Blind Shutter with speed indicator and Waterproof case complete.

4½ × 3½	6½ × 4½	8½ × 6½	10 × 8	12 × 10	15 × 12
£10	£12	£15	£20	£26	£31

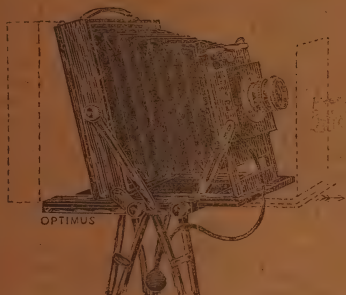
The extra cost of **Rapid Euryscope Lens** in place of Rapid Rectilinear is

4½ × 3½	6½ × 4½	8½ × 6½	10 × 8	12 × 10
27/-	37/-	46/-	78/-	150/-

PERKEN, SON & CO., LTD., 99, Hatton Garden, **LONDON.**
Holborn Viaduct,

"OPTIMUS"

Universal PHOTOGRAPHIC OUTFIT.



THIS camera has been produced in order to meet the requirements of those professional and amateur photographers who, requiring a serviceable camera with all necessary movements do not wish to make so large an expenditure as

is occasioned by the purchase of our highest quality instrument. The camera shewn in diagram is of excellent quality, it possesses leather bellows, rack and pinion focussing adjustment, and as diagram shows, a front and back swing, rising and falling front, mechanism for advancing the focussing screen quite near to the front when a short focus lens is in use, square reversing frame. The Lens is a Rapid Rectilinear with Iris diaphragms, and with Roller Blind Shutter fitted. The Tripod is very compact, strong and rigid.

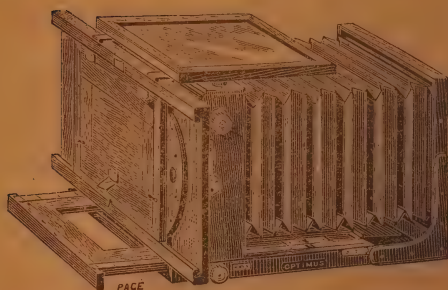
Price complete with one double dark slide.

		Half-plate.	Whole-plate.
With French Rapid Rectilinear	... ..	£3 : 10 : 0	£6 : 0 : 0
„ "Optimus" Rapid Rectilinear	... ..	5 : 15 : 0	9 : 0 : 0
„ "Optimus" Extra Rapid Euryscope	... ..	7 : 7 : 0	11 : 6 : 0
Extra double dark slides $\frac{1}{2}$ -plate 10/6, $\frac{1}{4}$ -plate 14/6.			

PERKEN, SON & CO., LTD., 99, Hatton Garden, **LONDON.**
Holborn Viaduct,

"OPTIMUS"

STUDIO CAMERA.



THIS instrument has been specially designed for studio and out door use. Its construction is very substantial at the same time the camera is not unduly heavy. The focussing

is by rack and pinion in the smaller sizes and by endless screw in the larger. There is a **Double Swing Back** and repeating frame. When used out of the studio the repeating frame is removed and a reversing frame substituted, and thus the ordinary double dark slide can be employed.

Camera with repeating frame, masks, and one single dark slide—

$6\frac{1}{2} \times 6\frac{1}{2}$	$8\frac{1}{2} \times 8\frac{1}{2}$	10 × 10	12 × 12	15 × 15
145/-	188/-	225/-	265/-	325/-

Extra for reversing frame—

$6\frac{1}{2} \times 6\frac{1}{2}$	$8\frac{1}{2} \times 8\frac{1}{2}$	10 × 10	12 × 12	15 × 15
20/-	25/-	30/-	35/-	45/-

Extra for double dark slides—

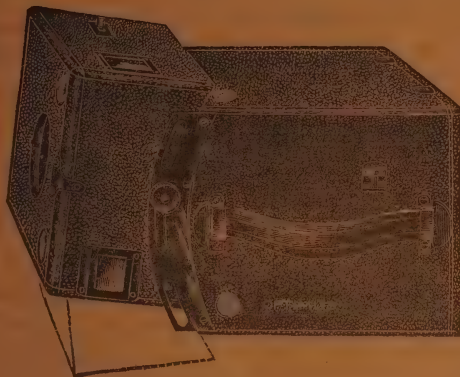
$6\frac{1}{2} \times 4\frac{3}{4}$	$8\frac{1}{2} \times 6\frac{1}{2}$	10 × 8	12 × 10	15 × 12
each 15/-	21/6	25/6	31/6	47/3

PERKEN, SON & CO., LTD., 99, Hatton Garden, Holborn Viaduct, **LONDON.**

"OPTIMUS"

"DOPFA"

Magazine Hand Camera.



**A MAGAZINE CAMERA with the
equivalent of a SWING BACK.**

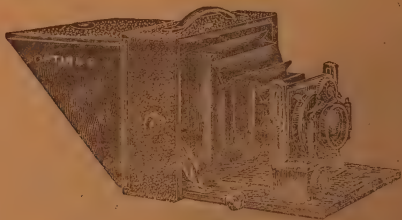
It has always been a serious drawback to magazine plate cameras that the instrument could not take photos of buildings without either an absurd amount of foreground or with the buildings having a leaning appearance. A swing back would overcome these disadvantages, but with a magazine camera this has still to be achieved. With this patented camera front the rising and falling of the lens is so arranged that the centre of the lens is always opposite the centre of the plate, no matter in what position the swing front may be. It is therefore the equivalent of a swing back, and the resulting photographs are free from distortion. The camera carries 12 $\frac{1}{4}$ -plates. It is furnished with two finders, two levels, and Optimus 5 by 4 Rapid Rectilinear Lens, with between lens shutter, time and instantaneous, of varying speed.

PRICE complete, covered in best leather . . . **£6 15s. 0**

Outside Dimensions, 9 in. by 5 in. by 6 in.

PERKEN, SON & CO., LTD., 99, Hatton Garden, Holborn Viaduct, **LONDON.**

"OPTIMUS" KOPIT HAND CAMERA.



Takes Plates $4\frac{1}{4}$ by $3\frac{1}{4}$ inches.

Oblong Pattern **£6 : 5 : 0** Complete

Square Pattern, with reversing frame **£7 : 5 : 0** "

This Camera is of such small size that it may be readily carried in the pocket. When in use it can be held in the hand or it can be attached with screw to Tripod for either horizontal or vertical pictures. Among the many advantages it possesses are the following :—

- * Rack and Pinion focussing adjustment.
- * Rising and falling front.
- * Swing back.
- * Between lens Time and Instantaneous Shutter.
- * Automatic Hood attached to Ground Glass, rendering focus cloth unnecessary.
- * Three double dark Slides.
- * Best workmanship throughout.
- * Brilliant View Finder.
- * Well seasoned Mahogany, covered with black leather of durable quality.
- * "OPTIMUS" EXTRA RAPID EURYSCOPE, F.6. fitted with Iris Diaphragm.

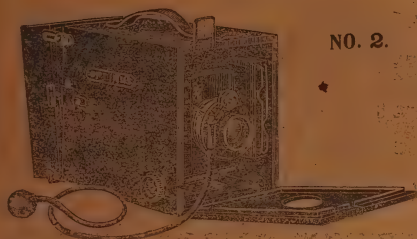
EXTRA DARK SLIDES, 10/- EACH.

Any make of Lens of suitable focus can be fitted to above camera.

PERKEN, SON & CO., LTD., 99, Hatton Garden, **LONDON.**
Holborn Viaduct,

"OPTIMUS"

UBIQUE HAND CAMERA.



NO. 2.

This instrument has been specially designed to provide a reliable hand and stand camera of small dimensions and ready for immediate snapshots without any preparation or setting up. There are three

models: No. 1 without swing back; No. 2 with swing back and rising front; and No. 3 with swing back, rising front and double extension. Each is complete with between lens shutter, released by finger or by a pneumatic ball, the focussing is by rack and pinion, a finder is fitted, and the three double dark slides are carried inside the instrument, which is neatly covered in best morocco leather.



NO. 3

Weight complete: under 3lbs. Dimensions: 9 by $4\frac{1}{2}$ by $5\frac{3}{4}$.

	No. 1 Model	No. 2 Model	No. 3 Model
With Optimus Rapid Rectilinear			
Lens	£4 0 0	£4 15 0	£5 15 0
With Optimus Rapid Euryscope			
Lens	£5 0 0	£5 15 0	£6 15 0

Extra double dark slides 5s. each.

Brass binding and pinning camera and dark slides 20s. extra.

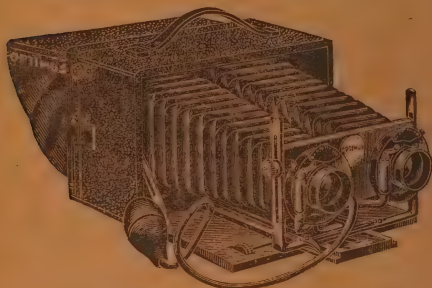
Any make of lens of suitable focus can be fitted to above cameras.

PERKEN, SON & CO., LTD., 99, Hatton Garden, Holborn Viaduct, **LONDON.**

"OPTIMUS"

STEREOSCOPIC

HAND AND STAND CAMERA.



This camera is arranged for use as a hand camera, and is furnished with a screw attachment for tripod. It has **swing back** and **rising and falling front**, and **automatic**

hood for shading the ground glass, rendering focus cloth unnecessary, and when not in use protecting the glass from fracture. There is a **rack and pinion** for accurate **focussing** with an engraved indicator for distances. **Any make of lenses can be employed.** Between lens shutters are provided, giving time and instantaneous exposures, and actuated by the finger, or by pneumatic ball and tube release. The outside is covered with durable leather, and possesses the compact and unobtrusive appearance of an ordinary hand camera.

Price, fitted with OPTIMUS RAPID RECTILINEAR

LENSES, and including three double dark slides for

Plates $6\frac{3}{4}$ by $3\frac{1}{4}$. £8 0 0.

Extra double dark slides, 12/6 each.

PERKEN, SON & CO., LTD., 99, Hatton Garden, Holborn Viaduct, **LONDON.**

"OPTIMUS"

3-FOLD TRIPOD STAND.



Rule Joint, Sliding Legs so as to suit uneven ground. Very compact, strong and rigid.

Suitable for Cameras up to $\frac{1}{4}$ pl.

Without Top (for Cameras with Turntables) 13/9

With Tops 15/9

EXTRA RIGID for Cameras up to 12×10 27/6

CHEAPER FORM of 3-fold Stand, with sliding leg and self-locking joints, suitable for $\frac{1}{4}$ or $\frac{1}{2}$ -plate Cameras ... 8/6

Fourfold Tripod Stand.

Very Portable.

16 $\frac{1}{2}$ inches when closed 52 inches high when set up.

Top leather covered 15/-

"Optimus" Telescopic Tripod

Price - 28s.

Section showing the form of tube, the three legs being close together.



Being made of Aluminium, this Camera Stand is admirably adapted for Cyclists, Tourists, and others who desire a light rigid Tripod. Though occupying exceedingly little space when closed, it extends to a full practical height when opened for use.

Section shows the three circular Tubes when close together.



Brass throughout, highly polished and lacquered 12/6

Aluminium throughout, highly polished and finished 18/6

Aluminium throughout, japanned tubes, automatic closing 23/6

LEATHER CASES for above Tripod, 4/- each.



PERKEN, SON & CO., LTD., 99, Hatton Garden, Holborn Viaduct. **LONDON.**

"OPTIMUS"

ROLLER BLIND SHUTTER

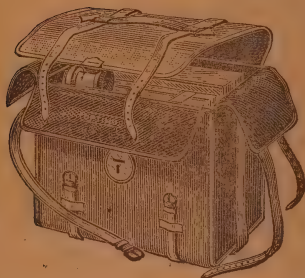
For Time & Instantaneous Exposures.

SPEED INDICATOR, BALL, and TUBE.



This Shutter is mounted in mahogany case, and is very light and strong. The working parts are of guaranteed finish, and are not likely to get out of order.

For Hoods up to	1 $\frac{1}{8}$	inches diameter	..	..	13/-
"	"	2	"	"	15/-
"	"	2 $\frac{1}{2}$	"	"	16/-



CAMERA CASES

Best Canvas, stiff, with lock, lined green cloth.

4 $\frac{1}{4}$ x 3 $\frac{1}{4}$	6 $\frac{1}{2}$ x 4 $\frac{1}{4}$	8 $\frac{1}{2}$ x 6 $\frac{1}{2}$	10 x 8	12 x 10
12/6	15/9	20/-	21/6	28/-
Leather, with lock lined green cloth.				
16/-	20/-	29/-	35/-	46/-

Any size made to order on receipt of dimensions

DARK CLOTHS.

Made of	Black	Waterproof	Size for	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{1}{3}$	$\frac{10}{8}$	$\frac{10}{6}$
"	"	Material ...		3/-	4/-	5/6	6/9	7/6
"	"	Velvet ...		1/-	1/6	2/-	2/6	—
"	"	"	lined with red or yellow—	2/6	3/-	3/3	3/9	5/-
"	"	"		4/-	4/6	5/4	6/-	8/-



Plain
Cylinder 8d.



Screw Adjust-
ment, 1/3



Archimedean
Screw Adjustment, 5/-

FOCUSSING GLASSES.

PERKEN, SON & CO., LTD., 99, Hatton Garden, Holborn Viaduct, **LONDON.**

"OPTIMUS" DARK ROOM LAMPS.

Square Folding Lamp.

FOR TRAVELLING.

Non-actinic fabric, non-breakable.

This lamp folds into a very small space, suitable for carrying in the pocket, when travelling. The sides are not glass, but a ruby fabric, (Unbreakable)... each **1/6**



The form of Lantern shown in the accompanying diagram presents a great many advantages. It possesses a powerful Lamp, so arranged, that the oil receptacle is isolated from the flame and cannot get heated. Plenty of air circulates. In front is a sheet of ruby glass (removable), behind which is a sheet of deep orange; it is, therefore, safe when developing the most sensitive of Plates. As the development progresses, the ruby glass can be raised, and the Negative examined by the orange glass only, enabling the amount of detail to be readily judged.

PRICE ... 7/4

Universal Dark Room Lamp.

THE principles upon which this lamp is constructed, are such as to render it of the greatest practical service for dark room work. It is made for gas, but may be adapted for oil if required, and has a special ventilating shaft which the diagram is unable to show. Movable windows of ground, ruby and orange glass, are fitted to the lamp, an arrangement that allows the colour of the light being varied at will, a great convenience to those whose photographic operations include the manipulation of bromide paper, orthochromatic and very sensitive plates, etc. Price ... **15/-**



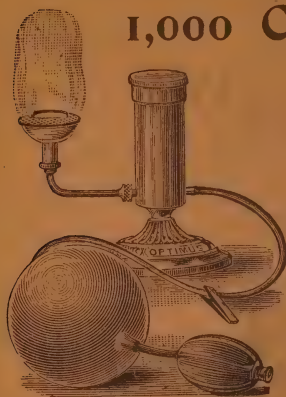
PERKEN, SON & CO., LTD., 99, Hatton Garden, Holborn Viaduct. **LONDON.**

"OPTIMUS"

1,000 CANDLE=POWER

(PHOTO-EXPOSURE)

ILLUMINATOR.

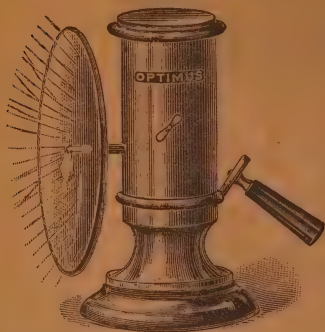


Magnesium powder is uninterruptedly blown through a spirit flame, causing not flashes—but a continuity of light more perfectly actinic than any other known.

Complete with Double
Inflation Blower

15s.

HOROLOGICAL MAGNESIUM RIBBON LAMP



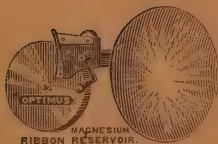
The Clock Movement is of superior finish. It feeds out the Ribbon at the necessary speed.

20s.

Extra Coils of Ribbon, each 1/-

Magnesium Ribbon Lamp,

5/-



MAGNESIUM
RIBBON RESERVOIR.

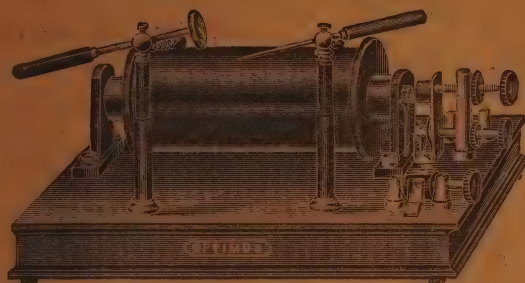
British Journal of Photography:

It is a neat little thing, not greatly exceeding the dimensions of an old-fashioned watch and projects a powerful beam of light

PERKEN, SON & CO., LTD., 99, Hatton Garden, Holborn Viaduct, **LONDON.**

"OPTIMUS"

**X RAYS
APPARATUS.**



PERKEN, SON & Co., Ltd., make a speciality of
the manufacture of

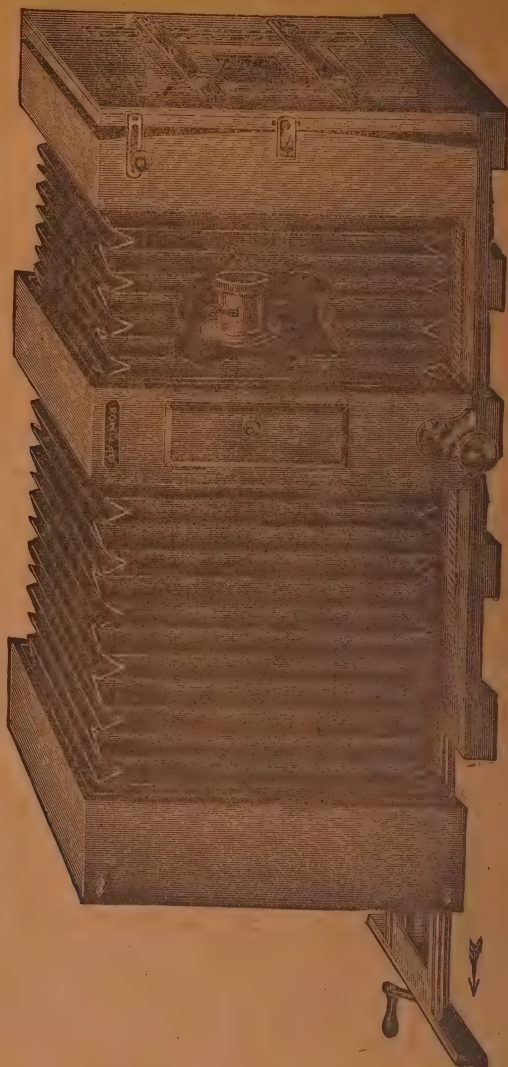
INDUCTION COILS.

Outfits are supplied to meet the requirements of all
workers, and quotations are given according to speci-
fications.

For prices of Coils, Focus Tubes, Batteries, etc.,
see catalogue sent post free on application.

PERKEN, SON & CO., LTD., 99, Hatton Garden,
Holborn Viaduct, **LONDON.**

"OPTIMUS" ENLARGING APPARATUS.



Direct Enlarging or Reducing Apparatus.

Prices and Particulars Next Page.

PERKEN, SON & CO., LTD., 99, Hatton Garden, Holborn Viaduct, **LONDON.**

"OPTIMUS"

ENLARGING APPARATUS.

The "Optimus" Direct Enlarging & Reducing Camera

Is arranged somewhat like the ordinary long extension instrument, but with this difference, that the negative to be enlarged or reduced is fitted into a proper receiver in the position that is ordinarily occupied by the lens, and the lens is attached to a central frame. A contrivance exists for the enlarging of any portion of a large negative and for the vertical correction in faulty negatives. The apparatus can be used in bright sunlight, and the illumination of the negative can be either by daylight or artificial light.

Price with Dark Slide—

Inches	10 × 8	12 × 10	15 × 12	18 × 16	24 × 20
	£11	£14	£20	£27	£40

The front of the Apparatus is removable, thus enabling the instrument to be used as an ordinary Camera.

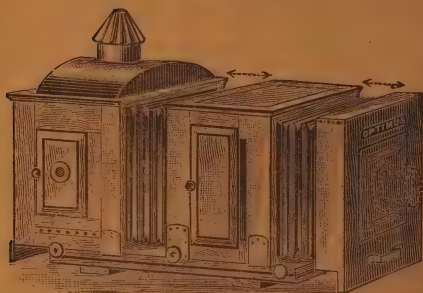
PERKEN, SON & CO., LTD.,

99, Hatton Garden,
Holborn Viaduct,

LONDON.

"OPTIMUS" PROJECTION CAMERA.

For Enlarging and Reducing.



IN constructing this instrument special care has been taken to maintain the minimum of bulk and the maximum of focal adjustment. When fully extended it is three times as long as when closed. A Compound Condenser is included, and fixed into an

adapter very easily withdrawn, so that another of different size may be readily substituted. This changing of Condensers enables the operator to obtain the best possible illumination, whatever may be the size of his negative, and to avoid the loss which must occur when the diameter of the Condenser greatly exceeds the diagonal of the negative to be enlarged. Three milled heads will be found near the baseboard attached to pinions and racks. One actuates the front chamber which carries the lens, another the rear chamber which carries the illuminant, and the third the condenser and negative, allowing of a final exact adjustment immediately before exposure, when it may be required. The body is of superior mahogany, ornamentally moulded and panelled. Altogether a very elaborate and complete instrument, warranted to facilitate the production of perfect results.

Complete with

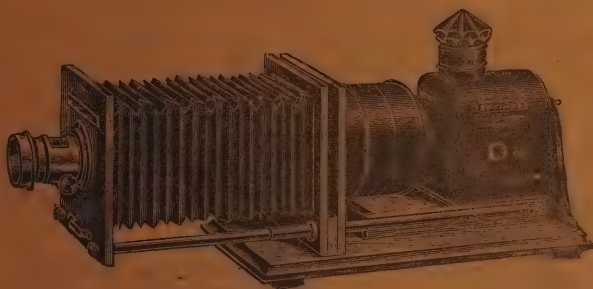
5 in. Compound Condenser,		150/-	with A Series Objective	27/-	
6	"	160/-	"	37/-	ALSO SEE
7	"	180/-	"	37/-	PRICES
8	"	260/-	"	63/-	OF
9	"	300/-	"	63/-	
10	"	370/-	"	105/-	GROSSAR
12	"	500/-	"	105/-	LENSES.
14	"	600/-	"	120/-	

Either 2-wick Oil Lamp, Safety Oxy-hydrogen Gas Jet, or Argand Gas Burner supplied with the Instrument.

PERKEN, SON & CO., LTD., 99, Hatton Garden, Holborn Viaduct, **LONDON.**

'OPTIMUS'

Cantilever Enlarger

"THE PROFESSIONAL."

THIS instrument has been specially designed to meet the requirements of the expert photographer, being provided with extra extension of bellows and lamp adjustment. The base, front and stages are made of well-seasoned mahogany; the brasswork is beautifully polished; the bellows is of durable leather, and the body is of best Russian iron. The lamp container is so arranged that it will take oil-lamp, incandescent gas-burner, acetylene gas-burner, lime-light jet or arc, or incandescent electric lamp.

Prices of above fitted for Oil or Incandescent Gas:—

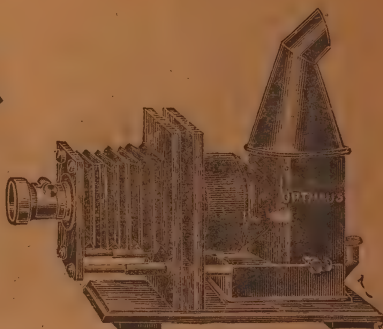
Diameter of Compound Condenser	5in.	6in.	7in.	8in.	9in.	10in.	12in.
Price without Front Lens ...	110/-	120/-	145/-	160/-	200/-	270/-	350/-
Extra for A Series Front Lens	27/-	37/-	37/-	63/-	63/-	105/-	105/-
„ B Series	15/-	20/-	20/-	25/-	15/-	63/-	63/-

GROSSAR Lenses are strongly recommended where fine definition is required.

PERKEN, SON & CO., LTD., 99, Hatton Garden, Holborn Viaduct. **LONDON.**

"OPTIMUS" CANTILEVER ENLARGING APPARATUS.

**PAMPHLET
ON ENLARGING
POST FREE.**



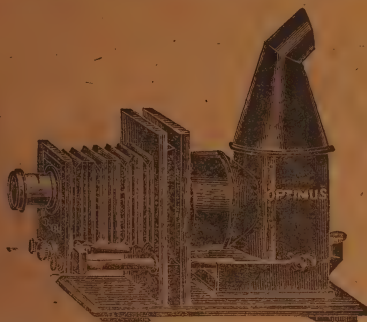
THIS instrument is finished in the best and most practical style. The base, stage, and front are made of well-seasoned mahogany; the brasswork is beautifully polished, the bellows of durable leather, and the lamp and cowl of best Russian iron; the optical system being of the best.

PRICES of above fitted for either oil or incandescent gas: -

Diameter of COMPOUND CONDENSER	}	5in.	6in.	7in.	8in.	9in.	10in.	11in.
Price, without front lens		... 70/-	80/-	98/-	110/-	150/-	200/-	260/-
Extra for A Series front lens	}	27/-	37/-	37/-	63/-	63/-	105/-	105/-
B Series		... .. 15/-	20/-	20/-	25/-	25/-	63/-	63/-
Grossar Lenses	... .. 85/-	85/-	85/-	125/-	155/-	155/-	205/-	
EXTRA CARRIERS for Negatives—								
	5in.	6in.	7in.	8in.	9in.	10in.	11in.	12in.
	2/6	2/6	3/6	3/6	3/6	4/6	4/6	5/6

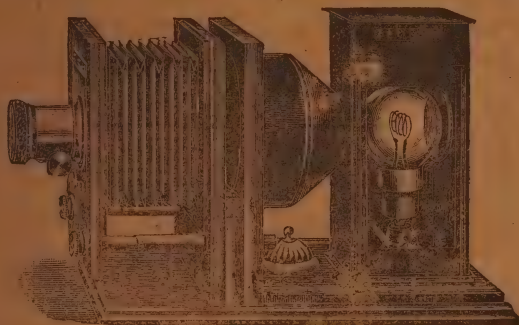
PERKEN, SON & CO., LTD., 99, HATTON GARDEN, HOLBORN VIADUCT. **LONDON.**

"OPTIMUS" CANTILEVER WITH FINE ADJUSTMENT.



The above diagram shows the ordinary Cantilever Enlarger with a fine screw adjustment fitted to the apparatus, so enabling accurate focussing to be done should it be desired to employ a lens not possessing the rack mount usual with portrait and Grossar lenses.

Extra cost of fine adjustment screw, fitted to any size of Cantilever **12/6**



The Electric Cantilever is supplied with an incandescent focus lamp, and where the electric supply is obtainable, this form of illuminant will be found a great convenience.

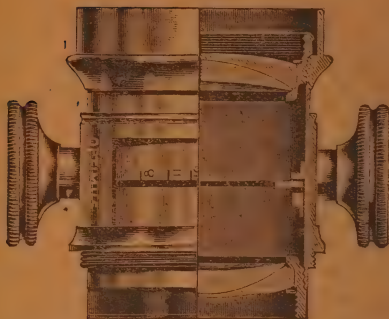
Extra cost of 50 C.P. lamp beyond the price of the oil lamp is for all size **25/-**
 " 100 " " " " " " " " " **30/-**
 " 150 or 200 " " " " " " " " " **35/-**

PERKEN, SON & CO., LTD., 99, Hatton Garden, **LONDON.**
 Holborn Viaduct,

"OPTIMUS"

ENLARGING LENS.

THE GROSSAR F.5'75.



THIS Lens has been specially designed for use with enlarging apparatus where artificial light is employed. The resulting enlargements are incomparably superior to those obtainable with the portrait lens usually selected for the

purpose, whilst the diameter of the combinations is so great that a brilliant and evenly lit picture is projected.

In quoting the prices below we give the number of each Lens and state the diameter of condenser which, in our experience, each Lens is best suited to work with.

The following prices are for Lenses mounted in brass with Rack Focussing Jacket, Iris Diaphragms and Leather Cap with Orange Glass.

No.	1	2	3	4
SUITABLE FOR CONDENSERS .	5 and 6 diam.	7 and 8 diam	9 and 10 dia.	12 diam.
PRICE £	4:5 0	6:5:0	7:15:0	10 5:0

The "Grossar" will be found to gives excellent results as a **Portrait Lens**, and as a **Projection Lens** when used on a **Lantern** it cannot be surpassed.

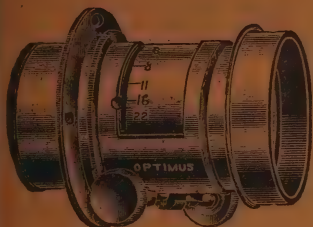
PERKEN, SON & CO., LTD., 99, Hatton Garden, Holborn Viaduct, **LONDON.**

"OPTIMUS"

PORTRAIT LENSES

FOR

ENLARGING.



These lenses are specially suitable for enlarging by projection, and can be used on the camera for ordinary portrait work. Each is supplied with diaphragms and orange glass cap.

A Series.

First Quality lenses, in rack mount with double milled head and fitted with **Iris Diaphragms.**

1/4 pl	5/4 pl	1/2 pl	1/1 pl
5in. Cond.	6in. Cond.	8in. Cond.	10in. Cond.
£ 1 : 7 : 0	£ 1 : 17 : 0	£ 3 : 3 : 0	£ 5 : 5 : 0

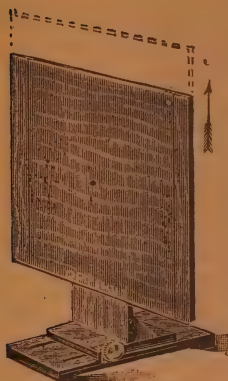
B Series.

In rack mount single pinion and with **Waterhouse Diaphragms.**

1/4 pl	5/4 pl	1/2 pl	1/1 pl
5in. Cond.	6in. Cond.	8in. Cond.	10in. Cond.
15s.	£ 1 : 0 : 0	£ 1 : 5 : 0	£ 3 : 3 : 0

PERKEN, SON & CO., LTD., 99, Hatton Garden, **LONDON.**
Holborn Viaduct,

"OPTIMUS" ENLARGING EASELS.



Made of American White Wood;
mounted on solid bases, and having
heightening and lowering adjustments.

For Enlargements up to—

15 by 15	20 by 20	25 by 25	30 by 30
12/6	18/-	22/-	26/-

Same as above but with Rack Adjustment	17/6	25/-	30/-	37/-
--	------	------	------	------

PINE TRAYS.

With Glass Bottoms and Shellac Varnished.

Size of Tray Each	4 $\frac{3}{4}$ by 3 $\frac{1}{2}$ 10d.	5 $\frac{1}{2}$ by 4 $\frac{1}{4}$ 1/-	7 by 5 1/3	8 by 5 $\frac{1}{4}$ 1/9	9 by 7 2/-	11 by 9 2/6
	13 by 11 2/9	6 by 13 3/9	21 by 17 7/-	24 by 18 10/6	25 by 19 17/-	

Condensers for Enlarging.

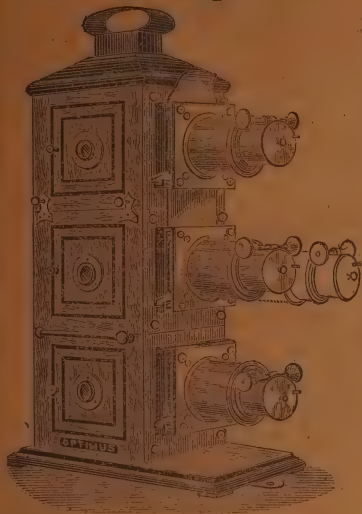


Each Condenser is composed of two
Plano-Convex Lenses, mounted in brass
cell furnished with ventilation holes.
The Lenses are not permanently fixed
but are easily removable, so that they
can readily be replaced in case of fracture.

Diameter in inches.	3 $\frac{1}{4}$	4 $\frac{1}{2}$	5	5 $\frac{1}{2}$	6	7
	6/-	15/-	18/-	21/-	25/6	40/6
	8	9	10	11	12	
	51/-	78/-	100/-	150/-	195/-	

PERKEN, SON & CO., LTD., 99, Hatton Garden, **LONDON.**
Holborn Viaduct,

"OPTIMUS" TRIPLE Oxy-Hydrogen LANTERN.



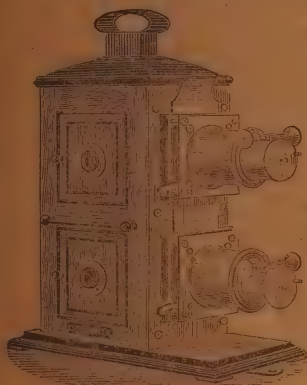
SEASONED Mahogany Body, 6 Panelled Doors, with Sight Holes, Moulded Foot, picked out with black, Finished Brass Stages and Sliding Tubes, Achromatic Photographic Combination Front Lenses, large diameter Back Lens, Compound Condensers of 4 inches diameter **£21 0 0**

SEASONED Mahogany and Rosewood Body, 6 panelled doors, with Sight Holes, Moulded Foot, Highly finished Brass Stages and Sliding Tubes, Compound Condensers, 4 inches diameter **Three-Draw** Telescopic Front Tubes, and **SIX** Photographic Front Lenses of 6in. and 8in. Focus **£36 0 0**

Three Safety Gas Jets **1 13 0**

"OPTIMUS" Triple Dissolving Tap (Patent) **1 13 0**

BI-UNIAL LANTERN.



SEASONED Mahogany Body, 4 panelled doors with Sight Holes, Moulded Foot picked out with black, Compound Bi-convex condensers of 4 inches diameter, Highly finished Brass Stages, and with Brass 3-draw Telescopic Front Tubes and **FOUR** Photographic Front Lenses of 6in. and 8in. focus **£18 0 0**

Ditto, Ditto, of the very finest quality and finish **24 5 0**

The Draw Tubes are specially rigid, so maintaining the Optical Axis accurately and ensuring the Front Lens, Condenser and Slide occupying Parallel Planes.

EXTRAS:

Best Safety Jets **11/- each**

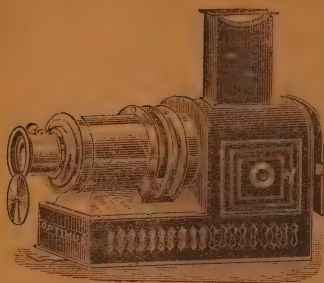
Or High Pressure Jets **16/6 "**

Optimus Six Way Star Dissolvers **15/- "**

Brass Curtain Slides **7/- "**

PERKEN, SON & CO., LTD., 99, Hatton Garden, **LONDON.**
Holborn Viaduct,

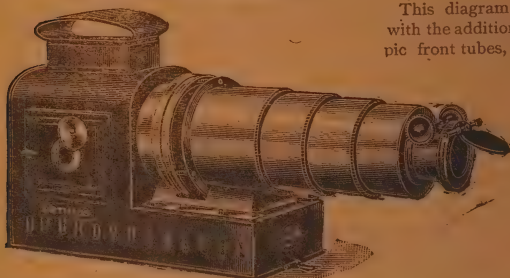
"OPTIMUS" MAGIC LANTERNS.



"OPTIMUS" Educational.

The Body is made of substantial Russian Iron, therefore very durable and unlikely to rust. It is of small size and light weight, therefore very portable. The Stage Plates and Sliding Tube are of well-finished brass. The Lens is a first-class Petzval Portrait Combination, giving really excellent definition. The Lamp is a Three Wick Refulgent. Complete in Outside Box for carrying **3 15 0**

If fitted with Stock's Lamp **4 3 6**

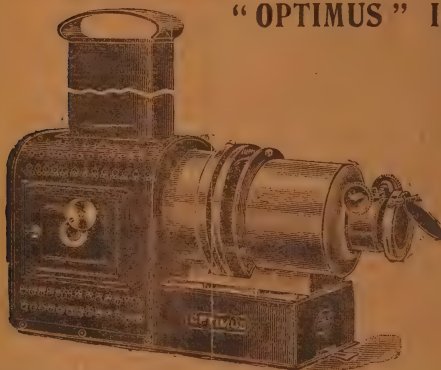


This diagram shows the above lantern with the addition of the three draw telescopic front tubes, thus enabling lenses of various foci to be used. Price with jacket with rack and pinion adjustment and one barrel lens **£5 15 0**

Prices of extra barrels containing photographic portrait combination lenses of

4, 6, 8, 10, 12 in. foci
each **10/-**

"OPTIMUS" Improved Educational.



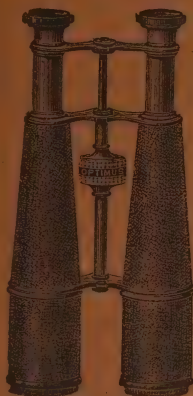
This Lantern is similar to that shown above at £3 15 0 but possesses the additional great advantage of an outer covering of stout perforated Russian Iron, thus permitting a current of air to pass over the heated inner lining. The extra cost of this valuable adjustment is

10/-

PERKEN, SON & CO., LTD., 99, Hatton Garden, Holborn Viaduct, **LONDON.**

"OPTIMUS"

BINOCULAR TELESCOPES.



EXTREMELY POWERFUL.

MOST PORTABLE.

"Optimus" Binocular or Twin Telescopes are especially recommended for use at long distances on sea and land. They are two to five times as powerful as ordinary field-glasses and, on that account, will take the place of a long single telescope. In addition they are much easier to use, and are sufficiently portable to be carried in the pocket. Those with Aluminium Mounting are about one-third the weight of ordinary metal.

			Length Shut.	Length Open.	Dia. of O. G.	Mag Power	Price.
No.						Diam	£ s. d.
1.	Morocco, covered, no	shades ...	5 $\frac{3}{4}$ in.	8 $\frac{3}{4}$ in.	7 $\frac{7}{8}$ in.	11	4:0:0
"	2.	Ditto with sunshade	6 $\frac{1}{4}$	8 $\frac{3}{4}$	1 $\frac{1}{16}$	12	5:0:0
"	3.	Ditto ditto	7	9 $\frac{1}{4}$	1 $\frac{3}{8}$	13	6:5:0
"	4.	Ditto ditto ...	8	10 $\frac{3}{4}$	1 $\frac{1}{2}$	18	6:15:0
"	5.	Ditto ditto ...	8 $\frac{1}{2}$	11 $\frac{1}{2}$	1 $\frac{1}{16}$	19	7:5:0
"	6.	Ditto ditto ...	10	13 $\frac{1}{2}$	1 $\frac{7}{8}$	25	10:0:0
No.	1.—Bright Aluminium Mountings, covered Russian Leather ...		5 $\frac{3}{4}$	8 $\frac{3}{4}$	7 $\frac{7}{8}$	11	8:0:0
"	2.—Ditto ditto ...		6 $\frac{1}{4}$	8 $\frac{3}{4}$	1 $\frac{1}{16}$	12	10:0:0
"	3.—Ditto ditto ...		7	9 $\frac{1}{4}$	1 $\frac{3}{8}$	13	12:0:0
"	4.—Ditto ditto ...		8	10 $\frac{3}{4}$	1 $\frac{1}{2}$	18	13:5:0
"	5.—Ditto ditto ...		8 $\frac{1}{2}$	11 $\frac{1}{2}$	1 $\frac{1}{16}$	19	14:18:0
"	6.—Ditto ditto ...		10	13 $\frac{1}{2}$	1 $\frac{7}{8}$	25	20:15:0

The above prices include brown or black leather cases with shoulder straps.

PERKEN, SON & CO., LTD., 99, Hatton Garden, Holborn Viaduct, **LONDON.**

"OPTIMUS"

PRISMATIC BINOCULAR.



THESE glasses have high power combined with enormous field of view, the definition being perfect to the margins. Each tube is fitted with a door in order to gain access to the prisms, which can then be easily cleaned, and by this means, the instrument can be quickly repaired when out of adjustment.

Magnifying 8 diameters £8 : 0 : 0.

The price includes Leather Case and Shoulder Strap.

A special catalogue of Optical Instrument is sent free on application.

PERKEN, SON & CO., LTD., 59, Hatton Garden, Holborn Viaduct, **LONDON.**



STRANGEWAYS & SONS
PRINTERS
AND PHOTO-ETCHERS.

4-10 TOWER STREET,
CAMBRIDGE CIRCUS.
LONDON, W.C.



Specimen of Half-tone Block by STRANGEWAYS & SONS, 4-10, Tower Street, Cambridge Circus W.C.



Specimen of Half-tone Block by STRANGEWAYS & SONS, 4-10, Tower Street, Cambridge Circus, W.C.

❖ ❖ ❖ ❖ ❖ ❖
❖ ❖ ❖ ❖ ❖ ❖
❖ STRANGWAYS ❖
❖ & SONS, Printers ❖
❖ and Photo-Etchers, ❖
❖ 4-10, Tower Street, ❖
❖ Cambridge Circus, ❖
❖ LONDON, W.C. ❖

❖ ❖ ❖ ❖ ❖ ❖
❖ ❖ ❖ ❖ ❖ ❖

R. & J. BECK, LTD.

MANUFACTURING OPTICIANS,

68, Cornhill, London, E.C.

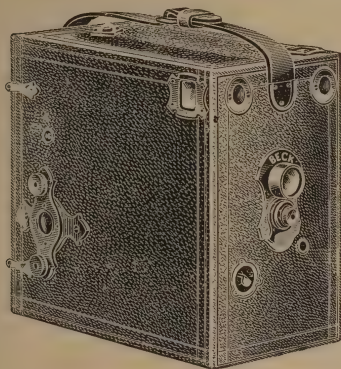
WRITE FOR CATALOGUES.

ONE LOAD

FORTY PICTURES

One movement changes the Film or Plate.

THE
NEW
FRENA.



THE
NEW
FRENA.

THE FRENA "MAX," 5 × 4.

EVERY Frena Camera is an English made Instrument throughout. There is a pleasure in knowing that not only the carcass of the Camera, but every fitting, shutter, finder, &c., are English in design and in workmanship. The Lens is a Beck Lens and is fitted to the Camera in such a manner that both are used to the best advantage. This Camera is made in the popular 5 × 4 size, and yet is little larger than the well-known $\frac{1}{2}$ -plate Frenas. It will also take 12 glass plates $\frac{1}{2}$ -plate size, in sheaths.

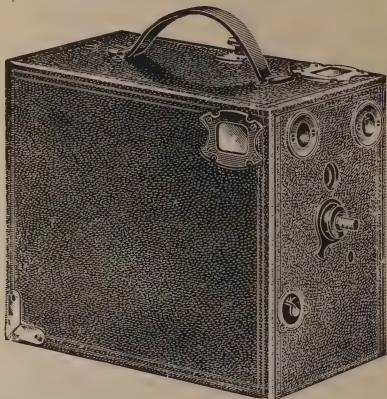
POINTS. 40 FLAT FILMS LIKE A PACK OF CARDS (5 × 4).
12 GLASS PLATES IN SHEATHS (4 × 3).
RECTILINEAR LENS (Double Meniscus).
BRILLIANT FINDERS (Carnex Patent).
SHUTTER, TIME and $\frac{1}{10}$ $\frac{1}{20}$ $\frac{1}{40}$ $\frac{1}{80}$.

PRICE (complete with 60 page Handbook) ... £2 18 6
With Beck-Steinheil Orthostigmat Lens ... £9 9 0

Catalogues of Cameras and Lenses.

Beck's Frena Cameras.

Nos. 10, 11 and 12.



THE F.O.P. FRENA CAMERAS.

THESE Frena Cameras have been on the market just a year and the sale has been enormous. They possess adjustments which are not usually found on Cameras of this price and we cannot do better than print a few unsolicited testimonials.

SOME USERS' OPINIONS.

"I am of the opinion that the Frena is still unbeaten in the domain of Hand Cameras after six years.

EYNHAM, 1902.

"Several of my friends and myself who possess and use your F.O.P. No. 10 Frena Hand Camera are so satisfied with its smooth and positive working, feel sure there is a good opening for a Camera of the same class, but taking larger pictures, say $4\frac{1}{2} \times 3\frac{1}{4}$ or 5×4 . (The Frena Max is now ready.

CHESTER, 1902.

"If your higher priced Cameras are as good in proportion to price as the F.O.P. is, they will win a lot of business. I have exposed nearly 200 films in mine and the only failures have been through my own fault, generally over exposure.

FLEETWOOD, 1902.

In so limited a space the Guinea Frena cannot be fully described, but write for sample prints of the work it does. It takes so flat Films like a pack of cards. It is also supplied with Rapid Rectilinear and Beck-Steinheil Lenses.

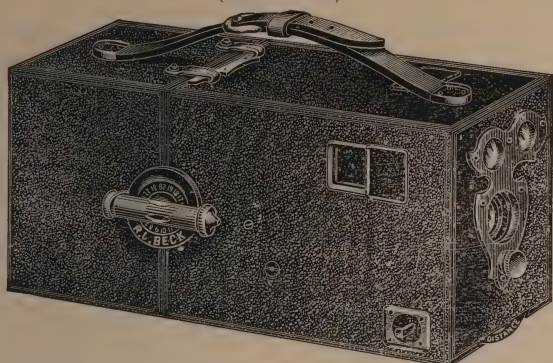
No. 10 F.O.P. FRENA (complete with Handbook) ...	£1	1	0
No. 11 " " (R.R. Lens. $f/8$) ...	£3	17	6
No. 12 " " (Beck-Steinheil $f/6.3$) ...	£6	7	6

R. & J. BECK, Ltd., 68, Cornhill, London, E.C.

Catalogues of "Flat" Film Cameras, Post Free.

Beck's Frena Cameras.

(Box Model.)



THE BOX MODEL FRENAS.

THESE Cameras have established a reputation which is justly envied, and have done so largely through their reliability. It is impossible to give all their points, but our full illustrated catalogue will be posted with sample prints on receipt of a post card.

They all take Forty Flat Films like a Pack of Cards which are dealt out one by one—they always remain Flat.

No.	Lens.	Size.	Apertures.	Shutter Speeds.	Weight.	Size.	PRICE.
00	Single	3 1/2 x 2 5/8	f/11 16 22 64	1/10 1/20 1/40 1/80	2 3/4	9 1/2 x 5 1/2 x 3 1/2	£2 18 8*
0	R.R.	3 1/2 x 2 5/8	f/8 11 16 22 64	1/10 1/20 1/40 1/80	2 3/4	9 1/2 x 5 1/2 x 3 1/2	5 5 0*
0	R.S.O.	3 1/2 x 2 5/8	f/6 8 11 16 22 64	1/10 1/20 1/40 1/80	2 3/4	9 1/2 x 5 1/2 x 3 1/2	8 15 0*
22	S.A.L.	4 1/4 x 3 1/4	f/11 16 22 64	1/5 1/10 1/20 1/40 1/80	4	11 1/2 x 5 1/2 x 4 1/2	5 8 6*
2	R.R.	4 1/4 x 3 1/4	f/8 11 16 22 64	1/5 1/10 1/20 1/40 1/80	4	11 1/2 x 5 1/2 x 4 1/2	8 17 6*†
2	R.S.O.	4 1/4 x 3 1/4	f/6 8 11 16 22 64	1/5 1/10 1/20 1/40 1/80	4	11 1/2 x 5 1/2 x 4 1/2	13 12 6*†
3	R.R.	5 x 4	f/8 11 16 22 64	1/5 1/10 1/20 1/40 1/80	5 1/2	12 1/2 x 6 1/2 x 5 1/2	12 12 0*†
3	R.S.O.	5 x 4	f/6 8 11 16 22 64	1/5 1/10 1/20 1/40 1/80	5 1/2	12 1/2 x 6 1/2 x 5 1/2	18 2 0*†

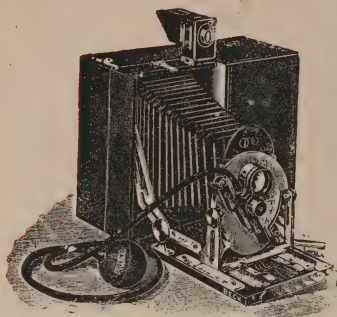
*Complete with 40 Flat Films and a Handbook of Instructions. †Including 4 Magnifiers.

SOLID. RELIABLE. ELEGANT. SERVICEABLE. ENGLISH.

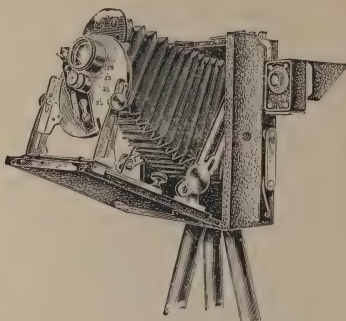
R. & J. BECK, Ltd., 68, Cornhill, London, E.C.

Catalogues Post Free.

The Folding Frenas



No. 8 Frenaz.



8. G.

TAKES 40 FLAT FILMS LIKE A PACK OF CARDS.

THESE Cameras are the outcome of the "Frena System" or Film changing, and possess all the adjustments of the most complicated Cameras. They take up very little room, all the adjustments of front and shutter occupy a space $1\frac{1}{2}$ deep. The shutter gives a faithful range of speeds from $\frac{1}{10}$ second to $\frac{1}{120}$.

No.	Lens.	Size.	Apertures.	Shutter Speeds.	Size.	PRICE.
8	B.S.O.	$4\frac{1}{4} \times 3\frac{1}{4}$	$f/6.3$ 8 11 16 22	$\frac{1}{10}$ $\frac{1}{20}$ $\frac{1}{40}$ $\frac{1}{80}$ $\frac{1}{120}$	$8\frac{1}{4} \times 5\frac{5}{8} \times 3\frac{1}{4}$	£11 18 6
8G	B.S.O.	$4\frac{1}{4} \times 3\frac{1}{4}$	$f/6.3$ 8 11 16 22	$\frac{1}{10}$ $\frac{1}{20}$ $\frac{1}{40}$ $\frac{1}{80}$ $\frac{1}{120}$	$5\frac{3}{8} \times 4\frac{1}{4} \times 1\frac{5}{8}$	10 7 0
*8GG	B.S.O.	$4\frac{1}{4} \times 3\frac{1}{4}$	$f/6.3$ 8 11 16 22	$\frac{1}{10}$ $\frac{1}{20}$ $\frac{1}{40}$ $\frac{1}{80}$ $\frac{1}{120}$	$8\frac{1}{4} \times 5\frac{5}{8} \times 3\frac{1}{4}$	14 7 6
8	B.S.	$4\frac{1}{4} \times 3\frac{1}{4}$	$f/5.6$ 8 11 16 22	$\frac{1}{10}$ $\frac{1}{20}$ $\frac{1}{40}$ $\frac{1}{80}$ $\frac{1}{120}$	$8\frac{1}{4} \times 5\frac{5}{8} \times 3\frac{1}{4}$	12 16 0
8G	B.S.	$4\frac{1}{4} \times 3\frac{1}{4}$	$f/5.6$ 8 11 16 22	$\frac{1}{10}$ $\frac{1}{20}$ $\frac{1}{40}$ $\frac{1}{80}$ $\frac{1}{120}$	$8\frac{1}{4} \times 5\frac{5}{8} \times 3\frac{1}{4}$	11 4 6
*8GG	B.S.	$4\frac{1}{4} \times 3\frac{1}{4}$	$f/5.6$ 8 11 16 22	$\frac{1}{10}$ $\frac{1}{20}$ $\frac{1}{40}$ $\frac{1}{80}$ $\frac{1}{120}$	$8\frac{1}{4} \times 5\frac{5}{8} \times 3\frac{1}{4}$	15 4 6
7	R.R.	$4\frac{1}{4} \times 3\frac{1}{4}$	$f/8$ 11 16 22 32	$\frac{1}{10}$ $\frac{1}{20}$ $\frac{1}{40}$ $\frac{1}{80}$ $\frac{1}{120}$	$8\frac{1}{4} \times 5\frac{5}{8} \times 3\frac{1}{4}$	9 8 6
7G	R.R.	$4\frac{1}{4} \times 3\frac{1}{4}$	$f/8$ 11 16 22 32	$\frac{1}{10}$ $\frac{1}{20}$ $\frac{1}{40}$ $\frac{1}{80}$ $\frac{1}{120}$	$8\frac{1}{4} \times 5\frac{5}{8} \times 3\frac{1}{4}$	7 17 0
6	V.A.	$4\frac{1}{4} \times 3\frac{1}{4}$	$f/11$ 16 22 64	$\frac{1}{10}$ $\frac{1}{20}$ $\frac{1}{40}$ $\frac{1}{80}$ $\frac{1}{120}$	$8\frac{1}{4} \times 5\frac{5}{8} \times 3\frac{1}{4}$	5 8 6

ILLUSTRATED CATALOGUES

N.B.—Sample Photographs taken with any of the above Cameras
free on receipt of stamp.

FREE.

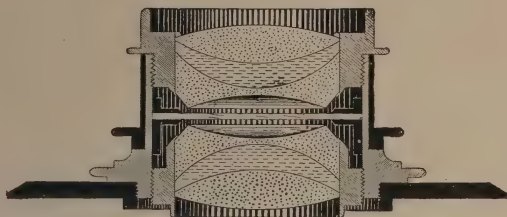
R. & J. BECK, Ltd., 68, Cornhill, London, E.C.

The Finest of Modern Anastigmats, Rapid f/6.3.

Beck=Steinheil Orthostigmat,

SERIES I, II & III.

f/6.3, f/6.8, and f/7.7, and also f/10.



THEY ARE MANUFACTURED WITH THE SAME CARE AS THE MOST DELICATE OF ASTRONOMICAL OBJECT GLASSES. . . . THE TESTS ARE SUCH THAT ERRORS AS SMALL AS $\frac{1}{100000}$ OF AN INCH ARE READILY DETECTED, AND EVERY COMBINATION IS INDIVIDUALLY INSPECTED. . . . HOWEVER GOOD THE ORIGINAL FORMULAE MAY BE, IT CAN BE RUINED BY INATTENTION TO DETAIL.

THE LENS IS THREE IN ONE. . . . A RAPID MEDIUM ANGLE LENS OF THE FINEST QUALITY. A FINELY CORRECTED WIDE ANGLE LENS COVERING OVER 90° THE SINGLE COMBINATIONS ARE WELL CORRECTED LANDSCAPE LENSES OF ABOUT DOUBLE THE FOCAL LENGTH OF THE LENS. IT HAS A CONVERTIBLE SERIES, WHOSE COMBINATIONS ARE DIFFERENT. . . . GIVING THREE FOCI FOR ONE LENS.

FOR PRICES NEXT PAGE.

FREE.

R. & J. BECK, Ltd, 68, Cornhill, London, E.C.

THE FINEST OF MODERN ANASTIGMATS.

Beck=Steinheil Orthostigmat.

SERIES I, II & III.

f/6.3, f/6.8, f/7.7 and f/10.

SERIES I.—The most rapid lens of its type. It is a wide angle medium and rapid narrow angle lens and is made throughout in England at our Kentish Town Works.

Apertures: Nos. 1-5, f/6.3; Nos. 6-8, f/6.8; Nos. 9-11, f/7 to f/8.

No.	Aperture.		Focal Length.		Recom- mended for plate.	Plate covered sharply.			PRICE.
	In.	Mm.	In.	Cm.		f/6.3	f/20.	f/40	
o	$\frac{1}{4}$	3	1	2.5	—	$\frac{5}{8} \times \frac{5}{8}$	$\frac{3}{4} \times \frac{3}{4}$	$1\frac{1}{2} \times 1\frac{1}{2}$	£4 7 6
oa	$\frac{1}{4}$	6	2	5	—	$1\frac{1}{8} \times 1\frac{1}{8}$	2×2	$2 \times 2\frac{1}{2}$	4 7 6
ob	$\frac{1}{2}$	10	$2\frac{1}{4}$	5.4	—	$1\frac{1}{2} \times 1\frac{1}{2}$	$2\frac{1}{2} \times 2\frac{1}{2}$	$2\frac{1}{2} \times 2\frac{1}{2}$	4 0 0
cc	$\frac{1}{2}$	13	$2\frac{3}{4}$	8	—	$2\frac{1}{2} \times 3\frac{1}{2}$	$3\frac{1}{2} \times 4$	$3\frac{1}{2} \times 4\frac{1}{2}$	4 7 6
i	$\frac{1}{2}$	14	$3\frac{1}{4}$	9	$3\frac{1}{2} \times 3\frac{1}{2}$	$3\frac{1}{2} \times 3\frac{1}{2}$	$4\frac{1}{2} \times 3\frac{1}{2}$	$4\frac{1}{2} \times 3\frac{1}{2}$	4 10 0
2	$\frac{1}{2}$	16	$4\frac{1}{2}$	10.5	$4\frac{1}{2} \times 3\frac{1}{2}$	$4\frac{1}{2} \times 3\frac{1}{2}$	$4\frac{1}{2} \times 3\frac{1}{2}$	6×4	4 15 0
3	$\frac{1}{2}$	18	$4\frac{3}{4}$	12	$4\frac{1}{2} \times 3\frac{1}{2}$	$4\frac{1}{2} \times 3\frac{1}{2}$	5×4	$7\frac{1}{2} \times 5$	5 0 0
4	$\frac{1}{2}$	22	$5\frac{15}{16}$	15	5×4	6×4	$7\frac{1}{2} \times 5$	$8\frac{1}{2} \times 6\frac{1}{2}$	6 0 0
5	$1\frac{1}{10}$	27	$7\frac{7}{8}$	18	$6\frac{1}{2} \times 4\frac{3}{4}$	$6\frac{1}{2} \times 4\frac{3}{4}$	8×6	$9\frac{1}{2} \times 7$	7 5 0
6	$1\frac{1}{4}$	31	$8\frac{1}{4}$	21	$7\frac{1}{2} \times 5$	$7\frac{1}{2} \times 5$	$8\frac{1}{2} \times 6\frac{1}{2}$	$11 \times 8\frac{1}{2}$	8 10 0
7	$1\frac{1}{6}$	36	$9\frac{1}{2}$	24	$8\frac{1}{2} \times 6\frac{1}{2}$	8×6	$9\frac{1}{2} \times 7$	$12 \times 9\frac{1}{2}$	10 10 0
8	$1\frac{1}{5}$	41	11	28	$8\frac{1}{2} \times 6\frac{1}{2}$	$8\frac{1}{2} \times 6\frac{1}{2}$	$11 \times 8\frac{1}{2}$	14×11	13 0 0
9	$2\frac{1}{8}$	53	$14\frac{1}{4}$	36	10×8	10×8	$12 \times 9\frac{1}{2}$	16×16	20 0 0
10	$2\frac{1}{2}$	72	19	48	12×10	$12 \times 9\frac{1}{2}$	16×12	24×20	30 0 0
11	$3\frac{1}{16}$	90	$23\frac{1}{2}$	60	15×12	16×12	20×16	28×24	45 0 0

SERIES II.—A convertible lens of great rapidity. Diaphragms for all lenses.

SERIES OF CONVERTIBLE ORTHOSTIGMATS, F 6.8 and F 7.7, 3 foci.

No.	Focus Single Lens. f/12.6		Com- bined Focus.	Aper- ture.	Size of Plates in inches.			PRICE with Brass Mount.
	Back.	Front.			Focus most suit- able for Plates	Can be used at Full Aperture	Plate Covered at	
1a	6	7	$3\frac{1}{2}$	f/6.8	$3\frac{1}{2} \times 3\frac{1}{2}$	$4\frac{1}{2} \times \frac{1}{2}$	5×4	£4 15 0
1b	6	$8\frac{1}{2}$	$4\frac{1}{2}$	f/7.7	$4\frac{1}{2} \times 3\frac{1}{2}$	$5\frac{1}{2} \times \frac{1}{2}$	$6\frac{1}{2} \times 4$	5 0 0
2a	7	$8\frac{3}{4}$	$4\frac{3}{4}$	f/6.8	$4\frac{1}{2} \times 3\frac{1}{2}$	$4\frac{1}{2} \times 3\frac{1}{2}$	$6\frac{1}{2} \times 4\frac{1}{2}$	5 2 6
2b	7	10	$5\frac{1}{2}$	f/7.7	5×4	5×4	7×5	5 15 0
3a	$8\frac{1}{2}$	10	$5\frac{1}{2}$	f/6.8	5×4	6×4	8×5	5 17 6
3b	$8\frac{1}{2}$	$11\frac{1}{2}$	$5\frac{15}{16}$	f/7.7	6×4	$6\frac{1}{2} \times 4\frac{1}{2}$	$8\frac{1}{2} \times 6\frac{1}{2}$	6 10 0
4a	10	$12\frac{1}{2}$	$6\frac{1}{2}$	f/6.8	$6\frac{1}{2} \times 4\frac{1}{2}$	7×5	9×7	7 0 0
4b	10	$14\frac{1}{2}$	$7\frac{1}{2}$	f/7.7	$6\frac{1}{2} \times 4\frac{1}{2}$	7×5	$9\frac{1}{2} \times 7\frac{1}{2}$	8 0 0
5a	12	$14\frac{1}{2}$	$7\frac{1}{2}$	f/6.8	7×5	7×5	9×8	8 10 0

All prices are strictly Nett Cash.

BECK-STEINHEIL ORTHOSTIGMATS are unquestionably the finest of modern lenses and are English made.

FREE
R. & J. BECK, Ltd., 68, Cornhill, London, E.C.

A Cheap Universal Lens—

Beck-Biplanat . . F/5.8.**For Rapid Work of all Kinds.**IN ONE
SERIES
ONLY.

IT gives better depth and covering power than a Portrait Lens, and need not be stopped down for this purpose.

At full aperture it is fast enough for extra rapid shutter exposures, and although it does not cover as well as the Orthostigmat, is sufficient for most of these photographs when the object of interest does not extend to the corners of the plate.

With stops $\frac{1}{8}$ to $f/22$ it is an excellent lens for landscape and pictorial photography. With small stops it will cover a wide angle.

Considering its extraordinary low price it may be recommended to all who do not wish to go to the price of an Orthostigmat, and should be chosen in preference to the Rapid Rectilinear types.

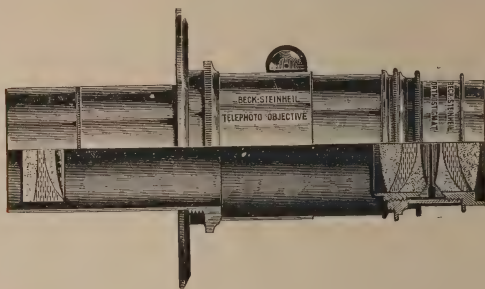
No.	Focus.	Focus of back Combination.	Plate covered $f/8$.	Plate covered $f/22$.	PRICE.
1	4 $\frac{1}{2}$	8	3 $\frac{1}{2}$ x 3 $\frac{1}{2}$	4 $\frac{1}{2}$ x 3 $\frac{1}{2}$	2 10 0
2	5	9	4 $\frac{1}{2}$ x 3 $\frac{1}{2}$	5 x 4	2 15 0
3	6	10 $\frac{1}{2}$	5 x 4	6 $\frac{1}{2}$ x 4 $\frac{1}{2}$	2 17 6
4	7	13 $\frac{1}{2}$	5 $\frac{1}{2}$ x 4 $\frac{1}{2}$	6 $\frac{1}{2}$ x 4 $\frac{3}{4}$	3 2 6
5	8 $\frac{3}{4}$	16	6 $\frac{1}{2}$ x 4 $\frac{3}{4}$	8 x 5	3 10 0
6	11	20	8 x 5	9 x 7	4 10 0
7	13	23	10 x 8	12 x 10	5 10 0
8	16	28	12 x 10	14 x 12	8 10 0

Write for a copy of "Practical Notes on Telephotography."

Beck-Stenheil Telephoto Lenses

For all distant Work.

CAN BE SUPPLIED TO FIT ANY GOOD PHOTOGRAPHIC LENS.



THE FINEST AND MOST CRITICAL DEFINITION IS ALWAYS OBTAINED WITH THESE LENSES.

ALL INTERESTED IN THIS BRANCH OF WORK SHOULD READ
"PRACTICAL NOTES ON TELEPHOTOGRAPHY" FREE.
 BOUND COPY 6d.

HIGH, MODERATE OR LOW POWER.

Full Catalogue on application.

Beck's Cornex Patent Finder.

A brilliant finder giving stationary image.

Beck-Harris Spectrum Filter,

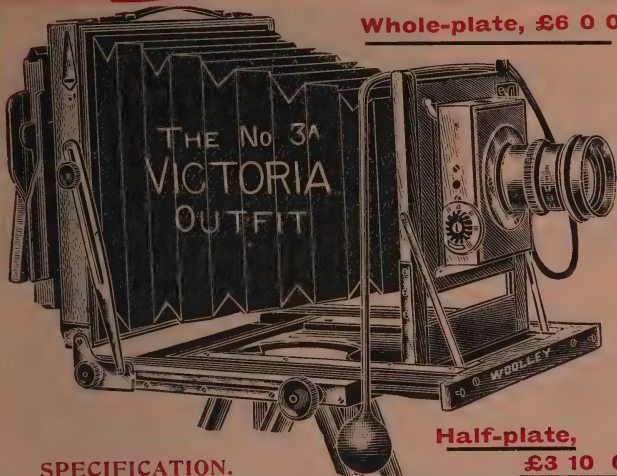
FOR ORTHOCHROMATIC PLATES AND TELEPHOTOGRAPHY.

FULL PARTICULARS AND PRICES FREE.

R. & J. BECK, Ltd., 68, Cornhill, London, E.C.

The "VICTORIA" Dry Powder Developers in glass tubes, Six Developers for 1/-.
The "VICTORIA" Combined Toner and Fixer, in powder, 24 ozs. of solution for 1/-.
The "VICTORIA" Washable Backgrounds in three combinations, from 2/3 each.

Victoria Cameras



Whole-plate, £6 0 0

Half-plate, £3 10 0

SPECIFICATION.

No. 3a Camera.—Polished Mahogany, very compact, Leather Bellows, Reversing and Swing Back, Double Extension, Back slides to the front for wide-angle lenses, Rising Front, and Handle for carrying, Turntable fitted in baseboard, and Level.

Dark Slide.—Polished Mahogany, Book-form, with Spring Catches to the Shutters.

Lens.—Rapid Rectilinear, Double Achromatic, Iris Diaphragm.

Shutter.—Thornton-Pickard Time and Instantaneous, with Speed Indicator and Pneumatic Release.

Stand.—Polished Ash, 3-fold.

We also supply complete Outfits from £1 1 0.

JAMES WOOLLEY, SONS & CO LTD
Victoria Bridge MANCHESTER
Illustrated Catalogue free on application

The "VICTORIA" Washable Backgrounds in three combinations, from 2/3 each.

Samples and Prices free on application.

"Victoria" Cameras

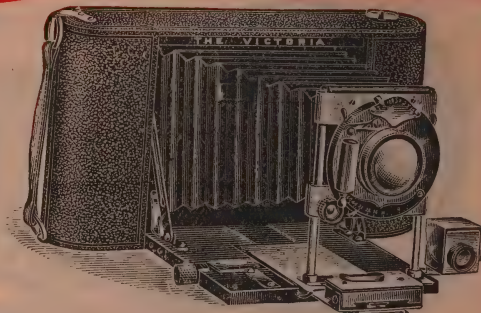
The No. 8 'VICTORIA'

Combination
Roll Film
Camera.

For Rollable
Film or Plates.

PRICE—

£3 12 6



This Camera, whilst possessing all the advantages of similar Continental made Pocket Cameras, is of **English manufacture throughout** (except lens and shutter), the body being made of best mahogany and covered with the finest leather. It is fitted with rising, falling, and cross front, and rackwork to baseboard, a **special feature** by which means lenses up to 7 in. focus of any make may be employed. The plate attachment is unique, the focussing screen or dark slide being fitted to it without the necessity of removing the back of the Camera, as is the case with the majority of other cameras of similar construction.

Further, the Dark Slides supplied for use with this Camera are of best English make (book form), and free from the defects so common to pull-out slides.

Camera, as illustrated, with **Rapid Rectilinear Lens**, and **Automatic Shutter** giving **Prolonged, Time and Instantaneous** exposures at various speeds.

£3 12 6

The Camera, without Lens or Shutter ... Price **£3 0 0**

Focussing Screen, with hinged leather flap and best English made Double Dark Slide, **11/6** extra.

Solid Leather Case, with shoulder strap for Camera **5/6**
Ditto, ditto, for three Double Dark Slides **4/6**

Further particulars will be gladly sent on application.

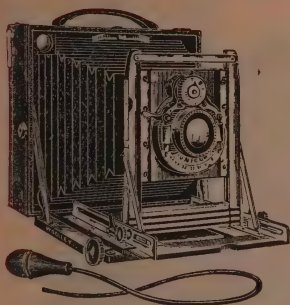
JAMES WOOLLEY, SONS & CO LTD
Victoria Bridge · MANCHESTER
Illustrated Catalogue free on application

The "VICTORIA" Washable Backgrounds, in three combinations, from **2/3** each.

Samples and Prices free on application.

The "VICTORIA" Dry Powder Developers for 1/-

The "VICTORIA" Combined Toner and Fixer, in powder, 24 ozs. of solution for 1/-



The No. 6a

'VICTORIA'

Tourist Camera.

For the Hand or Stand.

English Manufacture throughout with the exception of the Lens and Shutter.

FOR CYCLISTS,
TOURISTS, Etc.

Specification.

Camera.—Made throughout of best material, and covered in best leather, all metal work nickel-plated.**Slide.**—One best quality Mahogany book form Double Slide.**Lens.**—Bausch & Lomb's Rapid Rectilinear, of very fine quality.**Stops.**—Improved Iris form, actuated by lever.**Shutter.**—Bausch & Lomb's "Unicum," one of the most perfect Shutters ever invented, provided with a pneumatic release.**Focussing Scale.**—On the right hand side of the Camera.**Finder.**—Brilliant type, for use in sunlight.**Focussing Screen.**—Reversible, ground glass, protected by a leather-covered [flap].**Case.**—Solid Leather, with shoulder strap.

Measurements, Weights and Prices.

Size of Camera.	Outside Measurements.	Weight.	Extension.	Prices.
$\frac{1}{2}$ -plate	$6 \times 6 \times 1\frac{3}{4}$ in.	1 lb. 12 oz.	9 in. ..	£4 15 0
$\frac{3}{4}$ × 4	$6\frac{3}{4} \times 6\frac{3}{4} \times 2$ in.	2 lb.	11 in. ..	5 10 0
$\frac{1}{2}$ -plate	$8 \times 8 \times 3$ in.	3 lb. 4 oz.	13 in. ..	6 10 0

JAMES WOOLLEY, SONS & CO. LTD
 Victoria Bridge, MANCHESTER
 Illustrated Catalogue free on application

The "VICTORIA" Washable Backgrounds, in three combinations, from 2/3 each.

Samples and Prices free on application.

The "VICTORIA" Dry Powder Developers in glass tubes, Six Developers for 1/-.

"Victoria" Cameras

For Hand or
Stand Exposures
at long
or short range,
Groups, Por-
traits, Interiors,
Buildings, etc.

This Camera is
made of the
best material
throughout,
and is excep-
tional value.
Each individual
Camera minutely
examined.



SPECIFICATION.

Quarter-plate size.
Carries 12 Plates or 24 Films. Solid Leather Handle.
Improved Rapid changing arrangement.
Accurate Indicator. Achromatic Meniscus Lens.
Iris Diaphragms.
Shutter giving "Prolonged," "Time" and Instantaneous
Exposures at varying speeds.
Two Latest View Finders, with hoods.

Price .. £1 1 0.


Particulars of our other Hand Cameras on application.

JAMES WOOLLEY, SONS & CO LTD
Victoria Bridge-MANCHESTER
Illustrated Catalogue free on application

The "VICTORIA" Washable Backgrounds, in three combinations, from 2/3 each.

Samples and Prices free on application.

The "VICTORIA" Combined Toner and Fixer, in powder, 24 ozs. of solution for 1/-.



RICHMOND LONDON
S.W.

MORGAN & KIDD

INVENTORS
AND ORIGINAL
MANUFACTURERS
OF BROMIDE
PAPERS ♣ ♣

14 PRIZE MEDALS AWARDED

ARTISTS & TRADE
ENLARGERS ♣
IN BROMIDE
♣ ♣ CARBON
♣ PLATINOTYPE

PHOTOGRAPHIC
PRINTERS ♣

COLLOTYPE ♣
♣ HALF-TONE
BLOCKS & C

CATALOGUES POST FREE TO
PROFESSIONAL PHOTOGRAPHERS
AND DEALERS IN PHOTO-
GRAPHIC MATERIALS. • •

**Original Make . .
 . . still Unequaled.**

Bromide Papers.

*Natural Surface (smooth or rough) Platino-Matt, Cream Crayon,
 and Rose or White Enamels.*

PRICE PER DOZEN AND HALF-DOZEN, POST FREE.

Size.	*Natural Plat.-Matt. or Cream Crayon.		Enamels, Rose or White.		Size.	*Natural Plat.-Matt or Cream Crayon.		Enamels, Rose or White.	
	1 doz.	½ doz.	1 doz.	½ doz.		1 doz.	½ doz.	1 doz.	½ doz.
4½ x 3½	-/6	..	-/8	..	15½ x 12½	6/6	3/6	7/6	3/9
6½ x 4½	1/-	..	1/6	..	18 x 15	9/6	5/3	11/-	5/6
8 x 5	1/5	..	2/-	..	23 x 17	12/6	6/9	14/-	7/-
8½ x 6½	1/11	..	2/6	..	25 x 21	18/3	10/-	21/-	10/6
10 x 8	2/9	..	3/6	..	30 x 23	24/6	12/6	26/6	13/6
12½ x 10½	4/-	2/3	5/6	2/9	30 x 25	26/-	14/-	28/6	14/3

* Also in Rolls. 20ft. long; 25ins. wide, 17/6; 30ins. wide, 21/-; 40ins. wide, 28/-; and 53ins. wide, 36/6. **Enamel Bromide Paper**, 20ft. long, 25ins. wide, 20/-

NATURAL SURFACE (Rough or Smooth). This surface, either rough or smooth, is the Standard make in use for Enlargements. It is especially suitable for finishing with Brush (in Monochrome, Water-Colours, or Oils) or Crayon.

PLATINO-MATT. A beautiful, perfectly Matt-surfaced Paper, with the deep, rich, soft tones and pure whites of a Platinotype. For Contact Printing by artificial light Photographers will find this Paper most valuable.

CREAM CRAYON. A Cream-tinted Paper, with a natural surface, suitable for finish with Crayon or Brush. The tint of the paper mellows and warms the tones of the Print, and beautifully soft and artistic effects may be obtained upon it.

ROSE ENAMEL. A Rose-tinted Bromide Paper with a brilliant enamelled surface. The rose tint warms the tone of the Bromide Print, and, combined with the bright enamel surface, gives a resemblance to a Silver Print.

WHITE ENAMEL. A White Bromide Paper with a brilliant enamelled surface. This paper is especially suitable for subjects requiring rich, transparent, and brilliant shadows, and pure, high lights.

BOOKLET AND SAMPLE, POST FREE.

MATT SURFACE OPAL PLATES.

For Enlarging and Printing direct from Negative. Including a small sheet of Argentic Paper for trial exposure with every plate.

Size of Plate.	½ Doz.	¼ Doz.	Size of Plate.	½ Doz.	¼ Doz.	Size of Plate.	½ Doz.	¼ Doz.
4½ x 3½	2/6	..	12 x 7½	11/6	6/-	16 x 13	22/-	12/-
6½ x 4½	4/-	..	12 x 10	13/-	7/-	18 x 15	30/-	16/-
8½ x 6½	6/10	..	15 x 12	20/-	11/-	20 x 16	34/-	18/-
10 x 8	8/6	4/10	17 x 10½	20/-	11/-	24 x 18	46/-	24/-

ENLARGEMENTS

by the Bromide or by the Carbon or Platinotype Processes

Are produced with the most experienced care and skill. We promise our Clients the **best** their negatives will give, by whichever process they select, and at absolutely the lowest prices at which such work can be creditably produced.

Our style of Finishing has long been accepted as the most tasteful and artistic method of working upon a photographic basis, and has found imitators wherever Photographic Enlargements are made.

We have at our studios the **largest staff in the Kingdom** of trained, experienced, skilful Artists, and our Clients may rely on work entrusted to us being executed in the best and most attractive style and at the **lowest price** at which it can be treated with adequate skill and care. We undertake to give the utmost value for price paid, **whether we are finishing in best style or at lowest price.**

A FEW ARTISTIC SPECIALITIES IN BROMIDE ENLARGING.

Sepia Semi-Tints.—Mounted on best India Tint Plate Marked Boards with flesh delicately tinted in Water Colours. Complete Prices:—12 by 10 Bust Vig. **18s. 6d.**; 15 by 12 ditto, **25s.**; 23 by 17 ditto, **35s.**

The Mulready (Sepia or Black).—Enlarged on Cream Crayon Paper. Finished in Red and Black (or Sepia) Chalks. Complete in thick cut mount. 12 by 10 Bust Vig. **18s. 6d.**; 15 by 12 ditto **25s.**; 23 by 17 ditto **35s.**

Opals, Oval, Round or Oblongs.—Sepia or Black and White tones. Artistically Finished. Complete 10 by 8 or 8 in. **10s. 6d.**; 12 by 10 or 10 in. **14s.**; 15 by 12 or 12 in. **92s. 6d.**

**Our Artistic and Tasteful Enlarging
IS PROFITABLE. . . .**

BROMIDE ENLARGEMENTS ON PAPER.

Natural Surface, Platino-Matt, Cream Crayon, or White or Rose Enamel.
If Toned Sepia, 20 per cent. extra.

SIZE.	Enlargement unmounted.	Enlargement rough mounted and spotted.	Enlargement mounted, spotted, and in cut mount.	Enlargement mounted on India Tint mounts, and spotted.	FINISHING IN BLACK AND WHITE EXTRA.			PAINTING IN WATER OR OIL COLOURS EXTRA.		Framing in suitable solid Oak Frames, with gold slip.	
					3rd Class	2nd Class	1st Class	2nd Class	1st Class.		
6½ x 4½	..	1/9	1/-	1/3	1/3	2/-	4/-	7/6	5/-	10/-	2/9
8½ x 6½	..	1/6	2/-	2/3	2/3	4/-	8/-	12/-	10/-	20/-	3/6
12 x 10	}	2/6	3/-	3/9	3/9	5/-	10/-	15/-	15/-	30/-	5/6
12 x 7½											
15 x 12	..	3/-	3/9	4/9	4/9	6/-	12/-	18/-	21/-	40/-	6/6
17 x 10½	..	3/-	3/9	5/-	5/-	6/-	12/-	18/-	21/-	40/-	6/6
18 x 15	..	4/-	5/3	6/6	6/6	7/-	14/-	21/-	30/-	47/6	7/6
23 x 17	..	5/-	6/3	7/6	7/6	7/6	15/-	22/6	40/-	55/-	10/6
24 x 18	}	6/6	8/-	10/-	10/-	10/-	20/-	30/-	50/-	70/-	12/-
24 x 20											
30 x 22	..	10/-	11/9	14/-	14/-	12/6	25/-	37/6	55/-	85/-	13/-
30 x 25	..	12/6	15/-	17/6	17/6	15/-	30/-	45/-	60/-	100/-	14/-
36 x 28	..	15/-	20/-	27/6	27/6	20/-	40/-	60/-	60/-	100/-	15/-
40 x 30	..	17/6	23/6	...	...	22/6	45/-	67/6	...	...	25/-
50 x 30	..	20/-	30/-	...	...	25/-	50/-	75/-	...	...	30/-
48 x 36	..	25/-	35/-	...	...	30/-	60/-	90/-	...	...	35/-
60 x 30	..	25/-	40/-	...	...	30/-	60/-	90/-	...	...	65/-
60 x 40	..	35/-	52/6	...	...	35/-	70/-	105/-	...	...	84/-
96 x 50	..	65/-	96/-	...	...	70/-	140/-	210/-	Per Special Quotation.	Per Special Quotation.	148/-

BROMIDE ENLARGEMENTS ON OPAL.

SIZE.	Price of Enlargement.	FINISHING IN BLACK & WHITE EXTRA.			PAINTING IN WATER COLOURS EXTRA.			Plush Frames Gold Bevelled Matt.	Black and Gold Frames Gold Bevelled Matt. Pattern 747
		3rd Class.	2nd Class.	1st Class.	3rd Class.	2nd Class.	1st Class.		
½ plate or Cab.	2/-	2/6	5/-	10/-	5/-	10/-	20/-	...	...
8½ x 6½	4/-	5/-	10/-	20/-	10/-	20/-	40/-	6/-	5/6
10 x 8	4/6	6/-	12/-	24/-	12/-	25/-	50/-	7/6	6/-
12 x 7½	5/-	7/6	15/-	30/-	15/-	30/-	60/-	9/6	6/9
12 x 10	5/-	7/6	15/-	30/-	15/-	30/-	60/-	9/6	6/9
15 x 12	7/6	10/-	20/-	35/-	17/6	35/-	70/-	13/6	8/9
17 x 10½	7/6	10/-	20/-	35/-	17/6	35/-	70/-	13/6	8/9
16 x 13	9/6	11/-	21/-	36/-	18/6	36/-	72/-	16/-	10/-
18 x 15	13/-	14/-	25/-	40/-	20/-	38/-	76/-	17/-	12/-
20 x 16	16/-	16/-	27/-	42/-	22/-	40/-	80/-	18/9	12/6
24 x 18	21/-	20/-	30/-	46/-	25/-	45/-	90/-	22/6	13/6

**Common Work costs just as much
and is worth—NOTHING.**

Carbon Enlargements.

On Paper in Standard Brown, Engraving Black, Sepia or Red Chalk.

If no colour is specified in order, Carbon Enlargements are printed
in Standard Brown.

SIZE, approximate.	Printed Solid Unmounted.	Extra Copies. Solid. Unmounted.	Vignetted Unmounted.	Extra Copies, Vignetted. Unmounted.	Mounted on Cardboard, and Spotted Extra.	Mounting on India Tint and Spotting, Extra.	FINISHING IN MONOCHROME EXTRA.			PAINTED IN WATER OR OIL COLOURS EXTRA.	
							3rd Class	2nd Class	1st Class	2nd Class	1st Class
6½ x 4½	5/-	-/6	5/9	-/9	-/3	-/6	2/-	4/-	7/6	5/-	10/-
8½ x 6½	6/-	-/9	6/6	1/-	-/6	-/9	4/-	8/-	12/-	10/-	20/-
10 x 8	6/6	-/10	7/6	1/1	-/6	1/3	5/-	10/-	15/-	15/-	30/-
12 x 7½	7/-	1/3	8/-	1/6	-/6	1/3	5/-	10/-	15/-	15/-	30/-
12 x 10											
15 x 12	10/-	1/9	11/-	2/-	-/9	1/9	6/-	12/-	18/-	21/-	40/-
17 x 10½	10/-	1/9	11/-	2/-	-/9	2/-	6/-	12/-	18/-	21/-	40/-
18 x 15	13/6	2/6	14/6	2/9	1/3	2/6	7/-	14/-	21/-	30/-	47/6
20 x 16	14/6	3/6	16/-	3/9	1/3	2/6	7/6	15/-	22/6	40/-	55/-
23 x 17	15/-	3/9	17/6	4/-	1/3	2/6	7/6	15/-	22/6	40/-	55/-
24 x 18	16/-	4/-	18/6	4/6	1/6	3/6	10/-	20/-	30/-	50/-	70/-
24 x 20	17/6	4/6	20/-	5/6	1/6	3/6	10/-	20/-	30/-	50/-	70/-
30 x 22	27/-	8/6	30/-	9/9	1/9	4/-	12/6	25/-	37/6	55/-	85/-
30 x 25	33/-	10/-	36/6	11/-	2/6	5/-	15/-	30/-	45/-	60/-	100/-
36 x 28	38/6	14/6	42/6	16/-	5/-	12/6	20/-	40/-	60/-	70/-	120/-
40 x 30	45/-	17/6	50/-	19/-	6/-	..	22/6	45/-	67/6	80/-	135/-
44 x 34	55/-	22/-	60/-	24/6	10/-	..	25/-	50/-	75/-	90/-	175/-
48 x 36	66/-	24/-	72/-	26/6	10/-	..	30/-	60/-	90/-	120/-	200/-
53 x 36	73/-	27/6	80/-	30/-	10/-	..	35/-	70/-	105/-	140/-	220/-

Process Blocks.

HALF-TONE BLOCKS FOR TYPOGRAPHIC PRINTING.

*To Illustrate Books, The Pictorial Press, Trade Catalogues,
&c., &c.*

Photo-engraved from Paintings, Drawings, Photographs, or any object or
representation of an object that can be Photographed.

Price 8d. per sq. in. Minimum 6s.

Fine, Medium, or Open Grain, same price. No extra charge is made for
photographing small objects delivered at our Works, carriage paid, or for
making Negatives from Drawings, Photographs, &c.

The finest quality of block can be made from **Original Direct
Negatives** only. Do **not** send us copies if the Original Negative is
obtainable.

Booklet and Samples Post Free.

COLLOTYPE PRINTING.

Morgan & Kidd's Improved Collotype Method, of producing permanent machine-printed Ink Photographs.

Suitable for Superior Illustrations to Books and Catalogues,
Portraits, Views, Reproductions of Drawings and Paintings,
Fac-similes of MSS., Photographs of Estates for Sale, Machinery,
Furniture, Pottery, etc., etc., and of all Artistic and Commercial
Manufactures.

SIZE OF PAPER.	Size of Picture (about)	100 Copies.	250 Copies.	500 Copies.	1000 Copies.	2000 Copies.	5000 Copies.	Proofs.
		£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Any size to		1 5	6 1 14	6 2 6	3 10 0	5 14 0	10 4 0	11 0
Demy 8vo	8½x5½	6x4	1 11	6 2 0	0 2 14	0 3 18	6 6 6	13 16 6
Crown 4to	10x7½	7x5	1 17	0 2 9	0 3 6	6 4 18	6 7 16	6 6 0
Demy 4to	11½x8½	8x6	2 1	6 3 0	0 4 2	6 5 17	6 8 17	6 13 7
Royal 4to	12½x10	9x7	2 8	0 3 11	0 4 13	0 6 14	0 12 0	0 24 8
Imperial 4to	15x11	10½x8½	2 18	0 4 5	6 5 8	0 7 18	0 14 8	0 30 8
Foolscap	17x13½	11½x9½	3 8	6 5 1	0 6 11	0 9 11	0 16 11	0 34 11
Crown	20x15	14½x11½	4 0	6 5 15	6 8 5	6 11 5	6 20 15	6 40 15
Demy	22½x17½	16x13	4 7	0 6 4	0 9 16	6 14 6	6 25 16	6 50 16
Royal	25x20	18x15	4 14	0 6 16	6 10 19	0 16 19	0 29 19	0 58 9
Imperial	30x22	23x17	5 13	6 8 3	6 12 18	6 19 18	6 34 18	6 67 11
Dble. Demy	35x22½	28x18	6 18	6 9 16	0 15 6	0 23 6	0 40 11	0 78 1
Dble. Royal	40x25	38x23						

Proofs (not exceeding six copies) will be submitted at prices indicated in the last column; this charge will be remitted if an order for not less than 100 copies follow **within seven days after submission of Proofs**. If proofs are required in various tints, 25 per cent. extra charged for each additional tint.

SCRAPS.

View Scraps. Our Imitation Silver and Platinotype Prints can hardly be distinguished from real photographs.

Imitation Silver Prints for sale as Scraps or with hard surface for mounting as Opalines. Sets of Eight 8x6 size Views of a District. 1 gross of each View (8 gross in all), **£5**; 250 of each View, **£7**; 500 of each View, **£10**; or 1,000 of each View, **£17**.

Imitation Platinotype Prints. Sets of Eight 8x6 Views of a District. 1 gross of each, **90 -**; 250 of each, **£6 5s**; 500 of each, **£9**; 1,000 of each, **£15**. Sets of 1 dozen Views, packeted in envelope, with title, to sell at **1/-** for not less than **500**, **6d.** each.

The Latest and Best in View Publication.

THE Publication of Local Views is now a most important and remunerative branch of most Photographic Businesses, and we pay special attention to the requirements of Photographers and View Publishers. Attention is invited to the following popular forms of publication, printed in Collotype from Photographers' own negatives, readily saleable in every district.

PICTORIAL POST CARDS.

Printed in Sets of 25 different Views. **1,000** of each View, 15/- per 1,000; **500** of each at 17/6 per 1,000.

Printed in Sets of 12. 6 gross of each View (72 gross in all), £10; 3 gross of each, £7 4s.; 1 gross of each, 72/-

VIEW ALBUMS.

New 1903 Pattern. 12 by 10 View Album with 12 8½ by 6½ Views, mounted on one side only of stout tinted paper (grey, green or brown). Letterpress titles. Handsome stout paper cover with gold stamped title on front. A very artistic and attractive style to sell at 1/- Editions of **1,000**, 6d. each. **500** Editions at 6½d. each.

8 by 5½ Album in similar style, with 12 5½ by 3½ Views. To sell at 6d. Editions of **1,000**, 3d. each. **500** Editions at 3½d. each.

If ordered with a set of Post Cards the same plate can be used for both, and price will then be 2/9 per doz. for 1,000 Editions, and 3/- per doz. for 500 Editions.

10 by 7 View Album, with 20 8 by 5 Views. In stiff ornamental covers. To sell at 1/- Editions of **1,000**, 6d. each. **500** Editions, 6½d. each.

9½ by 7½ View Album, with 16 8 by 6 Views from negatives supplied to us, bound in handsome Imitation Leather, stiff covers with gold blocked title on front. To sell at 1/- Price, 4 gross Editions, 7/- per doz.; 8 gross Editions, 6/6 per doz.

7½ by 5½ Album, with 12 6 by 4 Views. Stout paper covers with gold stamped title. To sell at 6d. **1,000** Editions, 3d. each; **500** Editions, 3½d. each.

ENAMELS.

VITRIFIED PHOTOGRAPHS BURNT INTO ENAMELLED COPPER PLAQUES.

A very beautiful form of Miniature of great artistic value and absolute permanency, now established as a leading speciality in most high-class Photographic Businesses.

The image is formed of imperishable Ceramic colours, and is fired in the furnace at white heat, sufficient to sink it into the body of the enamel and give it a brilliant gem-like surface.

Every Photographer should have specimens of Enamels in Monochrome and in Colours. We pay great attention to the preparation of Specimen Sets, and supply them at special prices. Continual orders follow wherever a good set of Enamel Specimens is shewn.

PRICES OF REAL ENAMELS

From Original Negatives (Copies One-third Extra).

SIZES (approximate).	No. 3.	No. 5.	No. 10.	No. 15.	No. 20.	No. 23.	No. 25.	No. 30.
Ovals	$\frac{3}{4} \times \frac{9}{16}$	$\frac{7}{8} \times \frac{1}{6}$	$1\frac{1}{4} \times 1$	$1\frac{3}{4} \times 1\frac{1}{2}$	$2\frac{3}{8} \times 1\frac{7}{8}$	$2\frac{3}{4} \times 2\frac{1}{8}$	$3\frac{1}{2} \times 2\frac{3}{8}$	$4\frac{3}{4} \times 3\frac{3}{8}$
Rectangles .. ..	..	$\frac{1}{2} \times \frac{1}{2}$	$1\frac{1}{4} \times \frac{3}{4}$	$1\frac{1}{2} \times 1\frac{1}{4}$	$2\frac{3}{8} \times 1\frac{3}{4}$	3×2	$3\frac{1}{2} \times 2\frac{3}{8}$	$4\frac{1}{2} \times 3$
Rounds	$\frac{3}{4}$ diam.	$\frac{7}{8}$ diam.	1 diam.	$1\frac{1}{2}$ diam.	2 diam.	..	..	..
Enamels in Mono- chrome	10/-	10/-	12/6	15/-	20/-	23/-	25/-	30/-
Enamels painted in Colour	31/6	31/6	40/-	50/-	60/-	80/-	90/-	120/-
Copper Gilt Locket Rims in Morocco Case	6/-	6/-	7/-	8/6	10/-	11/6	12/6	17/-

Colours : Rich Brown, also Black or Bartolozzi Red to order.

Small Enamels either in Colours or Monochrome may also be set with charming effect in a variety of Jewellers' Settings as Pendants, Brooches Lockets, or Watch Domes, &c., &c.

MORGAN & KIDD,

Kew Foot Road, RICHMOND, London, S.W.

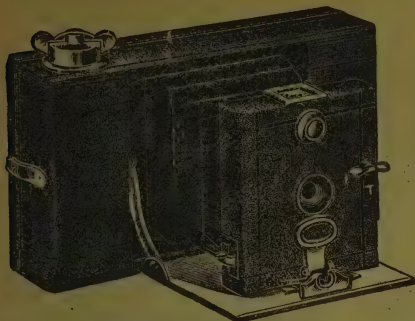
TELEGRAMS:

"ARGENTIC, RICHMOND, SURREY."

TELEPHONE:

P.O. RICHMOND 87.

No. 1 Roll Film Little "Nipper."



DAYLIGHT LOADING.

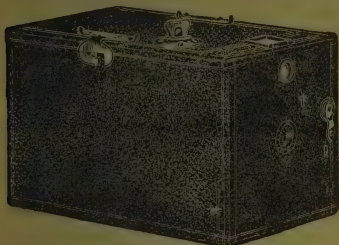
Takes Pictures $2\frac{1}{2} \times 2\frac{1}{2}$.

The No. 1 Film "Nipper" is the smartest little camera that has ever been made. It will go into the waistcoat pocket if necessary, is ready in a moment for use, takes good size pictures, and any number of photographs can be taken in the day, as it can be loaded in daylight.

Price 10/6

Waverley Daylight Cartridges, 6 Exposures, price 7d.

No. 1 "MAXIM."



DAYLIGHT LOADING ROLL FILM.

Takes $2\frac{1}{2} \times 2\frac{1}{2}$ Pictures.

Specification.

Strong wood body Camera.
Morocco Leatherette covered.
Ground-glass View Finder.
Time and Instantaneous Shutter.
Achromatic Lens.

Price 5/-

With View Finder.

Waverley Daylight Cartridges to fit, price 7d. per spool.

No. 2 "MAXIM."



DAYLIGHT LOADING ROLL FILM.

Takes $3\frac{1}{2} \times 2\frac{1}{2}$ Pictures.

Specification.

Strong wood body Camera.
Morocco Leatherette covered.
Leather Carrying Handle.
Brilliant View Finders.
Time and Instantaneous Shutter.
Adjustable Stops.
Achromatic Lens.

Price 10/-

Waverley Daylight Cartridges to fit, price 10d. per spool.

W. BUTCHER & SONS, Camera House, St. Bride Street, London.

To be had of all Dealers.

P

THE "MIDG" CAMERAS



No. O "MIDG."

Large diameter single achromatic view lens, best quality.
Time and instantaneous shutter with speed adjustments.
Catch for long time exposures.
Best quality brilliant view finders.
Improved infallible changing system.
Recorder for number of plates exposed, registering to 24.
Covered in handsome morocco-grained leatherette.
Improved door catches, very secure.
Screw and bushes for fixing to tripod.

Price 21/-, complete in box.

With Book of Instructions.

No. OO "MIDG."

This is a very similar Camera to the above pattern, but has the advantage of being fitted with magnifiers, so that objects at 4, 8 and 12 feet can be focussed.

Price 25/-, complete in box.

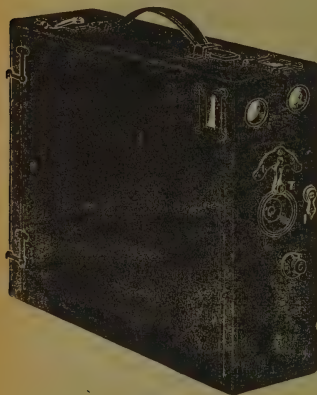
With Book of Instructions.



No. 000.

Same Camera as No. OO pattern, in 5 x 4 size.

Price 32/6, complete.



PANORAMIC "MIDG."

Takes 12 pictures $6\frac{1}{2} \times 2\frac{1}{2}$ inches.

Large diameter best single achromatic view lens.
Time and instantaneous shutter with speed adjustments.
Catch for long time exposures.
Best quality brilliant view finders.
Improved infallible changing system.
Recorder for number of plates exposed.
Covered in handsome morocco-grained leatherette.
Screw and bushes for fixing to tripod.

Price 30/-, complete.

W. BUTCHER & SONS, Camera House, St. Bride Street, London

These Cameras can be supplied by all dealers.

THE "MIDG" CAMERAS.



No. 1. Specification.

Rectilinear lens with iris diaphragm.
Focussing jacket for objects to 6 feet.
Time and instantaneous shutter with speed adjustments.
Catch for long time exposures.
Best quality brilliant view finders.
Indicator showing number of plates exposed.
Screw and bushes for fixing to tripod.
Very handsome morocco-grained cover.

Price £2 2 0

Complete in Box with Book of Instructions.

No. 2 "MIDG."

Similar Camera to No. 1 Pattern, but of superior finish throughout, and fitted with better quality Achromatic R.R. lens.

Price £2 10 0

No. 3 "MIDG." Takes 12 Plates or 24 Films, $4\frac{1}{2} \times 3\frac{1}{4}$ ins.

Specification.

Fitted with R.R. Lens and Bausch & Lomb's Unicum Shutter, with adjustable speeds for 1 second to 100th.
Pneumatic ball and tube and thumb release.
Focussing for all objects beyond 6 feet.
Two very superior brilliant view finders.
Infallible changing system.
Indicator showing number of plates exposed.
Screw and bushes for fixing to tripod.

Good solid leather handle.
Very handsome morocco-grained leatherette.
Polished ebony body inside.

Price £3 3 0

With Book of Instructions.

If fitted with BECK Lens ... **£5 5 0**

If fitted with GOERZ Double Anastigmat Lens ... **£8 0 0**

No. 4 "MIDG."

Takes 12 Plates or 24 Films, $4\frac{1}{2} \times 3\frac{1}{4}$ ins.

This is the same pattern Camera as No. 3, but has the following improvements:—

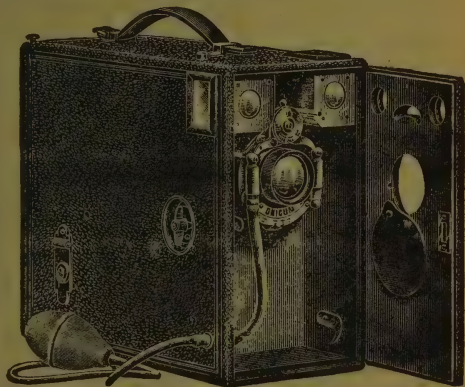
Real morocco covering.
Polished mahogany body inside.
Highly finished and reliable camera in every way.

Price £4 4 0

With Book of Instructions

If fitted with BECK Lens,
£6 6 0

If fitted with GOERZ Double Anastigmat Lens,
£9 0 0



W. BUTCHER & SONS, Camera House, St. Bride Street, London.
These Cameras are supplied by all dealers.

Photographic Outfits

NEW PHOTOGRAPHIC PRICE LIST
now ready, free on application.



70/-

$\frac{1}{2}$
Plate.

Every
Description of
CAMERAS and
APPARATUS
supplied.

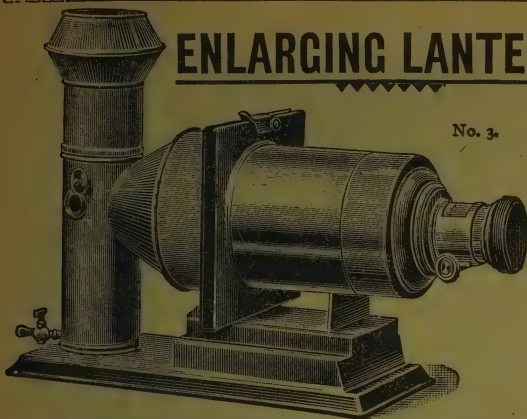
SPLENDID
VALUE.

- 42/- HALF-PLATE OUTFIT.**—Reversing and Swing Back, on Slide, Double Extension and W. A. Movement, Achromatic View Lens and Metal Revolving Shutter, two-fold Stand with straps. Quarter-plate, 21/-
- 50/- HALF-PLATE OUTFIT.**—W. A. Movement, Reversing Back, one Double Slide, Rectilinear Lens, Shutter with Pneumatic Release, two-fold Stand with straps. Quarter-plate, 35/- Whole-plate, 80/-
- 60/- HALF-PLATE OUTFIT.**—Same Camera as the 50/- Outfit, T. and I Shutter, with Speed Indicator, and R. R. Achromatic Lens, Turntable and three-fold stand. Quarter-plate, 42/- Whole-plate, 84/-
- 70/- HALF-PLATE OUTFIT.**—With every movement, one Double Dark Slide, Turntable, R. R. Lens, 'SWIFT' Time and Instantaneous Roller Blind Shutter, three-fold Rule Joint Stand with straps. (*Complete as illustration.*) Quarter-plate, 60/- Whole-plate, 110/-
- 84/- HALF-PLATE OUTFIT.**—Same as 70/-, with Camera and Slide brass bound.

Our Outfits are up-to-date, and Exceptional Value ; should be seen by every one.

W. BUTCHER & SONS, Camera House, St. Bride Street, London.
Our goods can be obtained of all dealers.

ENLARGING LANTERNS

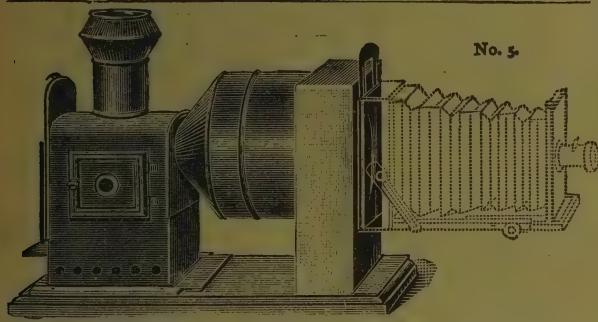


No. 3.

No. 7. As illustration complete.
 5½ in. Condr. £4 7 6
 6½ in. " " 6 6 6
 8½ in. " " 8 15 0

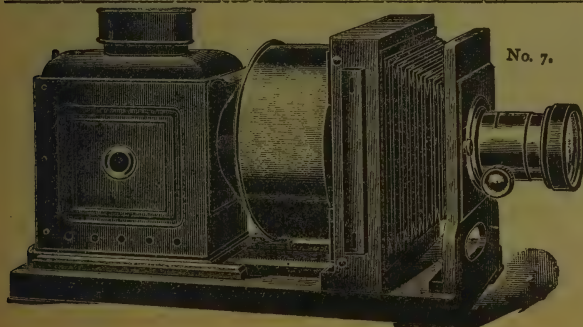
No. 6. As No. 5, but complete.
 5½ in. Condr. £5 10 0
 8½ in. " " 9 0 0
 11 in. " " 19 0 0

No. 5. As illustration for use with camera.
 £3 10 0
 5½ in. Condr. £3 10 0
 8½ in. " " 6 0 0
 11 in. " " 12 10 0



No. 5.

No. 4. For oil.
 5½ in. Condr. £3 3 0
 8½ in. " " 6 6 0

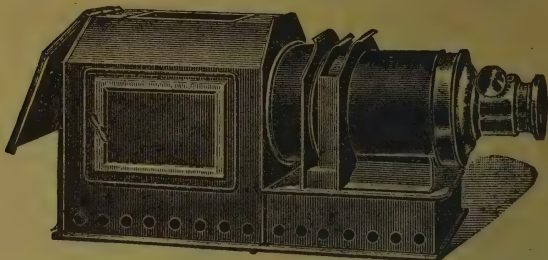


No. 7.

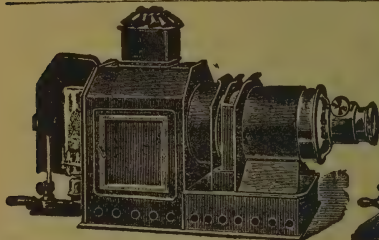
No. 3. As illustration for incandescent gas, complete.
 5½ in. Condr. £4 4 0
 8½ in. " " 7 7 0

No. 1. 4 in. Con- denser ... £1 10 0
 No. 2. 4 in. Con- denser, with ob- jective ... £3 3 0

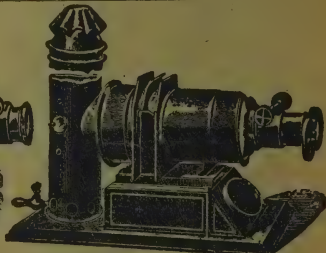
MAGIC LANTERNS.



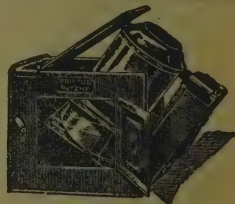
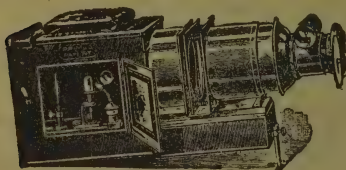
No. 1.	Japanned Tin, 2-wick Lamp	...	...	...	£0	18	0
2.	" incandescent	...	...	...	0	18	0
3.	" 3-wick lamp	...	...	...	1	0	0
4.	" 3-wick, in case	...	...	...	1	5	6
7.	Iron Body, "	...	...	...	1	5	6
8.	Russian Iron, 3-wick, in case	...	...	...	1	10	0
9.	" " "	...	...	...	1	15	0
11.	" " "	...	...	...	3	0	0
12.	" " "	...	...	...	4	0	0
13.	" " "	...	...	...	5	5	0



No. 5. For Incandescent Gas 25/6



No. 6. Incandescent 42/-



"PRIMUS" FOLDING LANTERN, £4 4s. Complete.

Write at once for our New Catalogue of Lanterns, containing full descriptions of every pattern lantern suitable for all purposes.

"Primus" Junior Lecturer's Series, $3\frac{1}{4} \times 3\frac{1}{4}$ **Each Set contains 8 Slides.**

- No.
 500 Sweep and Whitewasher.
 501 Willie's Revenge.
 502 Never Ride a Strange Horse.
 503 Nursery Rhymes.
 504 How Jing Jing Bagged his Quarry.
 505 Jag, Jag, the Rejected.
 506 Where there's a Will there's a Way.
 507 Foolish Bird and the Artful Hedgehog.
 508 Jack the Giant Killer.
 509 The Elephant's Revenge.
 510 Adventures of Mr. and Mrs. Brown with a Mouse.
 511 Puss in Boots.
 512 Jack and the Beanstalk.
 513 Old Mother Hubbard.
 514 Tale of a Tub.
 515 Ten Little Nigger Boys.
 516 Tom Thumb.
 517 A Country Courtship.
 518 Cock Robin.
 519 Red Riding Hood.
 520 Honey Stealers.
 521 Mr. O'Toole and his Umbrella.
 522 Living Siatuary.
 523 Caudle's Curtain Lectures.
 524 Comical Cats and Dogs.
 525 Every-day Street Sounds.

Price 2/3 per set.

Each s.t complete with Reading.

The Boer War of 1900-1902.

- 701 I. Boer invasion of Natal.
 702 II. Siege of Ladysmith.
 703 III. Relief of Kimberley.
 704 IV. Cronje and Bloemfontein.
 705 V. Relief of Mafeking and Entry into Pretoria.

The Life of Queen Victoria.

- 706 I. Early Life and Accession.
 707 II. Wedded and Public Life.
 708 III. Some Notable Events of Her Reign.
 709 IV. The Queen and Prince of Wales.
 710 V. The Queen's Death and Funeral.

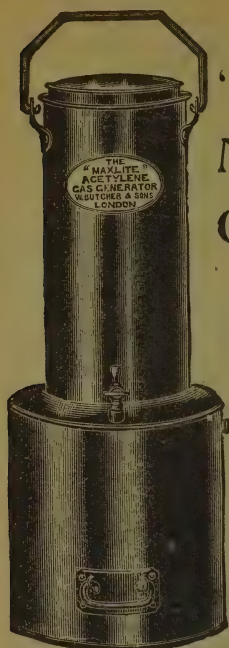
- 711 Accession of King Edward VII.
 712 The British Army. Chapter I.
 713 " " " " II.
 714 The British Navy. Chapter I.
 715 " " " " II.
 716 Our Lifeboat Men. " II.
 717 Our Firemen.
 718 Our South African Heroes. Chapter I.
 719 " " " " II.
 720 " " " " III.
 721 " " " " IV.

Price 2/6 per set.

Each set complete with Reading.

**W. BUTCHER & SONS, Camera House, St. Bride Street, London.**

Special List of these Slides free on application.



The
"Primus"
 Maxlite
 Generator.

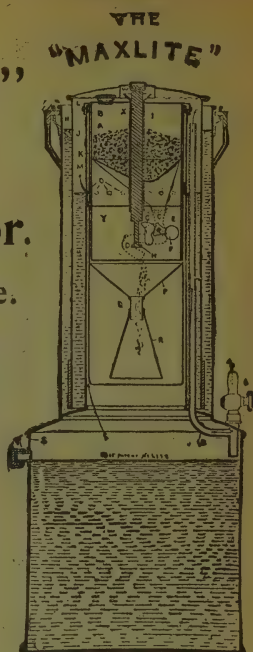
For Acetylene.

Equal Illumination
 to a Blow-thro'
 Jet.

Highest Efficiency.
 Lowest Cost.
 Least Trouble.

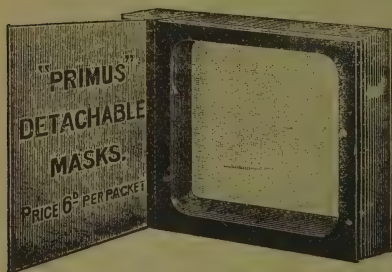
For Lecture Lan-
 terns, Limelight
 Projectors, Cine-
 matographs.

Price complete,
 £2 2 0



New Lantern Slide Masks.

"Primus" Detachable. (PATENT.)



An entirely new method of supplying the ordinary lantern mask.

As is well known to users, great difficulty is experienced when selecting a mask from a box, as the remainder generally become disarranged.

These masks are in pads, and being perforated on one side, they can be detached one at a time as required.

Series A—Black both sides.

Series B—Black and White.

Price 6d. per pad, containing 50 masks.

W. BUTCHER & SONS, Camera House, St. Bride Street, London.

KODAK.

Price List of . . .

KODAKS, KODAK FILMS,
PHOTOGRAPHIC
PRINTING PAPERS. &c.

KODAK, Limited,

41-43 Clerkenwell Rd., LONDON, E.C.

Wholesale and Retail Branches:

96 Bold Street, LIVERPOOL.

72-74 Buchanan Street, GLASGOW.

Retail Branches:

LONDON:—60 Cheapside, E.C.; 115 Oxford Street, W.;
171-173 Regent Street, W.; 59 Brompton Road,
S.W.; and 40 Strand, W.C.

PARIS: EASTMAN KODAK Société Anonyme Française, Avenue de l'Opéra 5,
Place Vendôme 4. Rue d'Argenteuil 6.

LYONS: EASTMAN KODAK S.A.F., 26-28 Rue de la République.

BERLIN: KODAK Gesellschaft, m.b. H., Friedrich Strasse 16. Friedrich Strasse 191

VIENNA: Graben 29.

BRUSSELS: Rue du Fossé aux Loups 36. Montagne de la Cour 59

ST. PETERSBURG: Bolschaja Konjuschennaja 1.

MOSCOW: Petrovka, Dom Michalkoff.

MELBOURNE: KODAK, LTD., 284 Collins Street.

MILAN: SOCIETÀ KODAK, 10 Via Vittore Pisani. 34 Corso V. Emanuele.

ROCHESTER, NEW YORK: Eastman Kodak Co.

**KODAKS and ACCESSORIES may also be obtained
of all photographic dealers.**

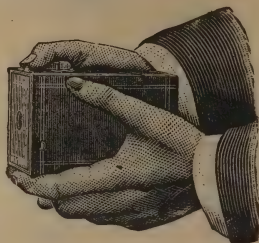
THE BROWNIE KODAKS.

No. 1 Brownie.

For roll film pictures, $2\frac{1}{4} \times 2\frac{1}{4}$ inches.

PRICE 5/- ONLY.

	s.	d.
Six Exposure Spool	0	7
Self-attaching Finder... ..	1	0
Sling Case	1	3
Developing and Printing Outfits	3	0



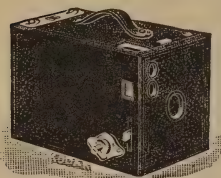
THE NO. 1 BROWNIE.

In spite of its small size and low price, the No. 1 Brownie is a thoroughly efficient little instrument. For snapshots as well as time exposures.

No. 2 Brownie.

For roll film pictures, $3\frac{1}{2} \times 2\frac{1}{2}$ inches.

PRICE 10/- ONLY.



THE NO. 2 BROWNIE.

	s.	d.
Six Exposure Spool	0	10
Portrait Attachment	1	6
Sling Canvas Carrying Case	2	0

Finders for both vertical and horizontal views. Set of three stops. New and convenient spool-holding devices. Improved non-detachable winding key. Everset time and instantaneous shutter.

MARVELLOUS VALUE.

No. 2 PLICO KODAK.

For pictures $3\frac{1}{2} \times 3\frac{1}{2}$ inches on roll film.

A well-made camera at a remarkably low price.

Handy, Compact and Portable.

Takes the ordinary No. 2 Bull's-Eye Spool.

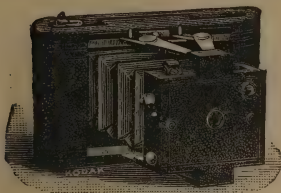
PRICE of the No. 2 Plico Kodak,

21/-



THE NO. 2 PLICO KODAK.

HANDY FOLDING POCKET KODAKS.



No. 0 Folding Pocket Kodak.

(The New Bijou Kodak.)

For roll film pictures $2\frac{1}{2} \times 1\frac{5}{8}$ inches.

The neatest folding pocket camera ever introduced.

No. 0 F.P.K. £1 6 0

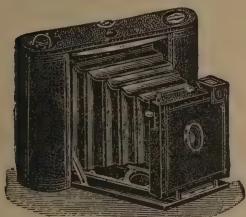
No. 1 „ 2 2 0

No. 1A „ 2 10 0

See illustration above.

No. 1 Folding Pocket Kodak.

For roll film pictures $3\frac{1}{4} \times 2\frac{1}{4}$ inches.



No. 1A Folding Pocket Kodak.

For roll film pictures $4\frac{1}{2} \times 2\frac{1}{2}$ inches.

The above models are opened or closed by one simple instantaneous movement, and are as readily carried in the pocket as a pocket book.

No. 2 F.P.K. £3 3 0

See illustration above.

No. 2 Folding Pocket Kodak.

For roll film pictures $3\frac{1}{2} \times 3\frac{1}{2}$ inches.

Very similar to the smaller folding pocket Kodaks, with the additional advantage that it is adapted for use on a tripod.



No. 3 Folding Pocket Kodak.

For $4\frac{1}{2} \times 3\frac{1}{2}$ (quarter plate) pictures, on roll film or glass plates.

Marvellously compact and portable. Readily carried in the pocket. Fine R.R. lens. Brilliant reversible finder. Accurate focussing scale. Sockets for tripod screw, etc.

The No. 3 Folding Pocket Kodak folds up so as to slip readily into the pocket, or it may be conveniently carried in the hand by means of the light strap attached to one end of the camera.

No. 3 F.P.K. £3 12 6

Glass Plate Adapter &
1 Plate Holder, extra 0 12 6

Extra Plate Holders,
each - - - 0 2 3

No. 2

BULL'S-EYE KODAK.**For Cartridge Film only.**Size of picture $3\frac{1}{2} \times 3\frac{1}{2}$ inches.

Has an improved rotary shutter.

Achromatic lens with set of three stops.

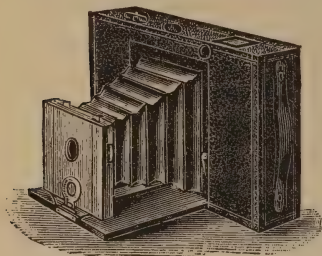
Socket for tripod screw.

PRICE (not loaded) **£1 13s.****No. 2 FOLDING BULL'S-EYE KODAK.****For Cartridge Film only.**Size of picture $3\frac{1}{2} \times 3\frac{1}{2}$ inches.Folds up to $1\frac{1}{4}$ inches in thickness. Made of wood and thus extremely light.

Has a removable spool holder, rendering the operation of recharging the camera extremely simple and easy.

May be carried in an overcoat pocket.

The baseboard has socket for tripod screw.

PRICE (not loaded) **£1 10s.****No. 2 SPECIAL BULL'S-EYE.**

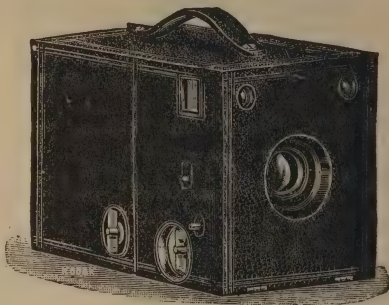
Like the No. 2 BULL'S-EYE but with a Rapid Rectilinear Lens, having Iris diaphragm, and high-class triple-action shutter.

PRICE (not loaded) **£3 3s.****No. 4 BULL'S-EYE.**Size of picture 5×4 inches.

Achromatic Lens with set of three stops. Everset Time and Instantaneous Shutter. Two view finders. Sockets for tripod screw. An accurately adjusted focussing scale.

PRICE (not loaded) **£2 10s.****No. 4 SPECIAL BULL'S-EYE.**

Like the above, but with a Rapid Rectilinear Lens, having Iris Diaphragm and triple-action shutter.

PRICE (not loaded) **£4 4s.****No. 4 SPECIAL BULL'S-EYE.**

The No. 2 BULLET KODAK.

For FILM and GLASS PLATES.

For pictures $3\frac{1}{4} \times 3\frac{1}{4}$ inches on film, and $3\frac{1}{4} \times 3\frac{1}{4}$ inches on glass plates, in single or double plate holders.

OTHERWISE LIKE BULL'S-EYE KODAKS

PRICE (not loaded) £2 2s.

The No. 2 SPECIAL BULLET.

Like the above, but for glass plates in double plate holders, and with R.R. Lens, having Iris diaphragm and triple-action shutter.

PRICE (not loaded) £3 15s.

The No. 4 SPECIAL BULLET KODAK.

For pictures 5×4 inches on cartridge film or glass plates.

PRICE, with one double plate holder and focussing screen ... £4 15s.

Extra double plate holders, each 5s.

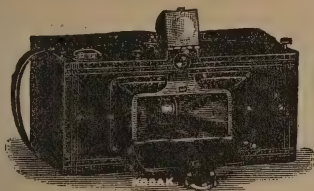
For glass plates as well as Cartridge film.

Fine R.R. Lens, Iris diaphragm, triple-action shutter, trigger and pneumatic release to shutter, focussing scale, &c.

The PANORAM KODAK.

Awarded the Medal of the Royal Photographic Society.

The Panoram Kodak is available for a great variety of subjects: wide views of landscape and seascape, squares, broad open thoroughfares at the intersection of streets, etc., and, when held vertically, it also yields charming upright views of such



The No. 1 PANORAM gives pictures $7 \times 2\frac{1}{4}$ ins.

" 4 " " " $12 \times 3\frac{1}{2}$ "

subjects as waterfalls, mountains, etc.

No. 1 PANO-
RAM KODAK, not
loaded, with illus-
trated manual, price
£2 10s.

No. 4 PANO-
RAM KODAK, not
loaded, with illus-
trated manual, price
£3 10s.

LOADED AND UNLOADED IN DAYLIGHT.

THE No. 2 STEREO KODAK. For ROLL FILM only.

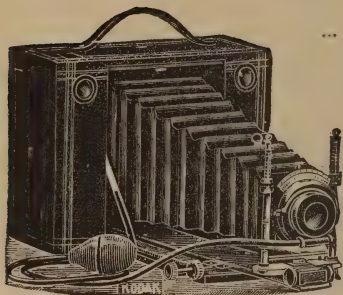
The No. 2 Stereo Kodak is of the ever-ready box pattern, and is remarkably easy to work in every respect. It is handsomely covered in fine grain leather with nickel-plated fittings and has a large brilliant finder which shows the exact scope of view. The lenses are rectilinear doublets accurately paired.

Price £3 10s. od. not loaded.

The No. 2 Stereo Kodak uses the ordinary No. 2 Bull's-Eye Spools, and yields the stereoscopic pairs of pictures or single $3\frac{1}{4} \times 3$ in. exposures at will.

The CARTRIDGE KODAKS.

For FILM and PLATES.



CARTRIDGE KODAK (OPEN).

No. 3. For quarter-plates and $4\frac{1}{2} \times 3\frac{1}{4}$ inches roll film pictures.

No. 4. For pictures 5×4 inches, on film and plates.

No. 5. For pictures 7×5 inches on film, and 7×5 inches or $6\frac{1}{2} \times 4\frac{3}{4}$ inches on plates.

... Rapid Rectilinear Lenses, with Iris diaphragm, triple-action pneumatic and trigger release shutters. Long extension movement. Rising, falling and sliding fronts.

Can be fitted with wide-angle Lenses.

Equally perfect for hand and tripod use.

Self-contained.

No cumbersome accessories.

Can be carried in a bicycle case which clamps within the frame or to the head of the machine.

PRICES.—No. 3 Cartridge Kodak (not loaded) £4 4s.

Glass Plate Attachment ros. 6d.

No. 4 Cartridge Kodak (not loaded) £5 5s.

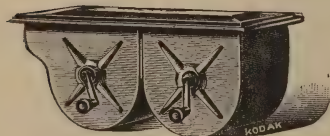
Glass Plate Attachment ros. 6d.

No. 5 Cartridge Kodak (not loaded) £7 7s.

Glass Plate Attachment 12s. 6d.

KODAK

DAYLIGHT DEVELOPING MACHINE.



The Kodak Developing Machine.

Develops Kodak Films in Daylight—Gaslight—Lamp-light—Any Light—Anywhere.

No handling of the films. No stained fingers. A child can use it.

Style "A" Machine for all Kodak films up to and including $2\frac{1}{2}$ inches - 26/-

Style "E" Machine for all Kodak films up to and including 5 inches - 33/-

Spools of Kodak

Daylight=Changing Cartridge Film.

					Double-Two		6 exp.		12 exp.		Box of	
					(4 exp. spools).		spools.		spools.		4 spools	
					s.	d.	s.	d.	s.	d.	s.	d.
4½ × 2 ins.	Pocket Kodak	...	...	...	—	—	—	—	1	3	4	6
2½ × 2½ „	No. 1 Brownie Kodak	...	...	...	—	—	0	7	—	—	2	4
2½ × 3½ „	No. 2 Brownie Kodak	...	...	...	—	—	0	10	—	—	3	4
1½ × 2½ „	No. O Folding Pocket Kodak	...	...	...	—	—	0	7	1	2	4	8
2½ × 3½ „	No. 1 F.P.K. * and No. 1 Panoram	...	...	...	—	—	0	11	1	9	7	0
2½ × 4½ „	No. 1A Folding Pocket Kodak	...	...	...	—	—	1	3	2	6	—	—
3½ × 3½ „	No. 2 Bull's-Eye Kodak, No. 2 ‡ Stereo Kodak, &c.	...	...	...	0	10	1	3	2	6	—	—
3½ × 4½ „	No. 3 Folding Pocket Kodak and ‡ Stereo Weno Camera	...	...	...	1	0	1	6	3	0	—	—
4½ × 3½ „	No. 3 Cartridge Kodak	...	...	...	1	0	1	6	3	0	—	—
3½ × 4½ „	No. 3 Zenith (3½ in. spool)	...	...	...	—	—	—	—	3	0	—	—
4 × 5 „	No. 4 Bull's-Eye Kodak, † No. 4 Panoram, &c. (4 in. spool)	...	...	...	1	3	1	11	3	9	—	—
4 × 5 „	No. 4 Special Bullet Kodak (old model)	...	...	...	—	—	—	—	3	9	—	—
5 × 4 „	No. 4 Cartridge (5 in. spool)	...	...	...	1	3	1	11	3	9	—	—
7 × 5 „	No. 5 Cartridge (7 in. spool)	...	...	...	2	3	3	4	6	8	—	—

NOTE.—Roll-holder spools as used in the Zenith Cameras and the No. 4 Special Bullet (old model) are not issued in short lengths.

* For No. 1 Panoram read 3 and 6 exposures, instead of 6 and 12 respectively.

† For No. 4 Panoram read 2 and 5 exposures, instead of 6 and 12 respectively.

‡ For Stereo Weno and No. 2 Stereo Kodak read 2, 3 and 6 exposures, instead of 4, 6 and 12 exposures respectively.

The Double-two exposures 4 × 5 in. spools are not suited for use in the No. 4 Panoram Kodak.

SOLIO P.O.P.

Varieties: WHITE, PINK, MAUVE, MATTE.

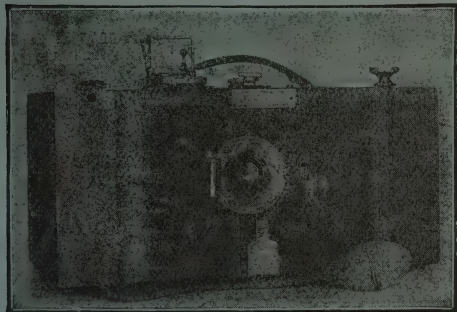
For Pocket Kodak prints, containing 50 double pieces	1/-	4 × 5 Packet, containing 24 sheets
„ No. 1 Folding Pocket Kodak prints, containing 57 sheets		4½ × 6½ „ „ „ 16 „
„ No. 1A Folding Pocket Kodak prints, containing 44 sheets		5 × 7 „ „ „ 14 „
3½ × 3½ Packets, containing 47 shts.		7½ × 2½ No. 1 Panoram
3½ × 3½ „ „ „ 40 „		5 × 7½ Packet, containing 13 „
3½ × 4½ „ „ „ 36 „	Per Packet.	13 × 4 No. 4 Panoram
		6½ × 8½ Packet, containing 9 „
		8 × 10 „ „ „ 6 „
		10 × 12 „ „ „ 4 „

Sheets 17 × 24½, per Quire, 15/-; ½ Quire, 7/6; ¼ Quire, 4/-; 1-12 Quire, 1/4.

6 × 4½ inches, SPECIAL CABINET SIZE, 24 sheets 1/-.

For P.K. prints (double pieces) 20 sheets	6d.	3½ × 3½ „ „ „ 20 sheets
„ Brownie Kodak, 2½ × 2½ „ 36 „		3½ × 3½ „ „ „ 18 „
„ No. 1 F.P.K. 2½ × 4½ „ 24 „		3½ × 4½ „ „ „ 16 „
„ No. 1A „ 2½ × 4½ „ 18 „		5 × 4 „ „ „ 10 „

GREAT ADVANCE IN PANORAMIC CAMERAS.



PATENT APPLIED FOR.

HINTON'S Panoramic CAMERA

*With RISING FRONT, Lens used either ROTATING or
FIXED at will. Does all the work of both Panoramic or
Ordinary Hand Camera.*

The Camera will take either a 12 by 4 panoramic negative on a curved film, or by a simple self-contained device the film may be straightened to a plane surface and the lens centrally fixed, and it will then take an ordinary snapshot or time negative, 6 by 4, and the lens may be focussed from any distant subject to within 6 feet.

NO LOOSE PARTS. EVERYTHING SELF-CONTAINED.

EXPOSURES, Panoramic or Ordinary, can be mixed as desired on same spool of film.

DAYLIGHT LOADING. TWO CAMERAS IN ONE.

Write for full list in preparation.

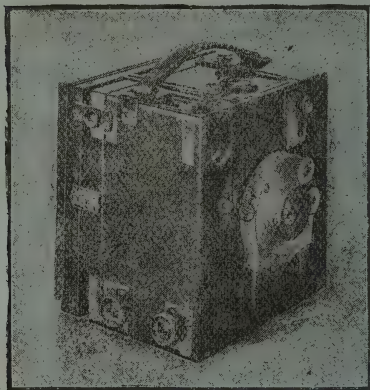
HINTON & CO
38 BEDFORD STREET
STRAND, W.C.

**MANUFACTURERS
and
PATENTEES.**

Telegraphic Address:
"SENSITIZE, LONDON."

HINTON'S "REX" CAMERA

For Hand or Stand Use.



The Illustrations are photographed all from the same camera, and show the "REX" as equipped for all classes of work.

AS A HAND CAMERA it is ready for immediate use without any setting up or unfolding. Extension back and front for long focus and telephoto work.

RISING FRONT, SWING BACK, and REVERSING BACK, LEVEL and SUNK BRILLIANT FINDER.

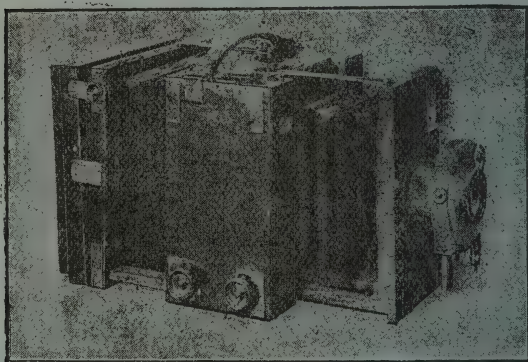
EXTREMELY LIGHT AND EFFICIENT.

TWO PATTERNS—

No. 1 with Front Shutter.

No. 2 with Focal Plane Shutter.

PRICES from £10 10.



*Send
for
Complete
Description
and
Price List.*

~~~~~  
 $\frac{1}{4}$ -plate,  
 5 x 4  
 $\frac{1}{2}$ -plate.  
 ~~~~~

Weight of
 $\frac{1}{4}$ -plate size,
 under 3 lbs.

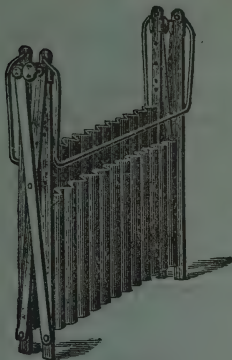
**SOLE DESIGNERS
AND MAKERS:**

Telegraphic Address—

"SENSITIZE, LONDON."

HINTON & CO
 38 BEDFORD STREET
 STRAND, W.C.

HINTON'S New Patent Adjustable Folding Rack.



PRICES.

Lantern
to Whole plate,

5/-

Zinc Tank with
syphon for ditto,

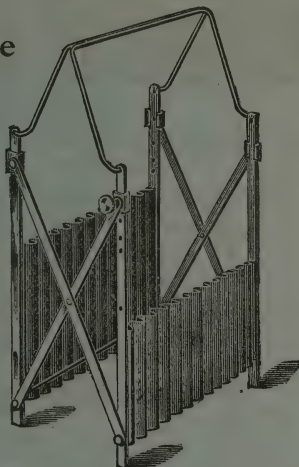
6/6

Lantern to
12×10

7/6

Zinc Tank with
syphon for ditto,

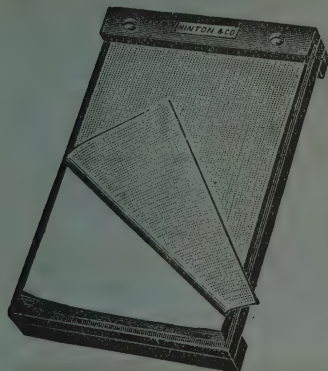
8/6



A.—Rack folded when not in use.

B.—Rack partly expanded for plates

Any sized plate may be put into the rack from Lantern size or smaller to *whole plate* in the *small* size, and from Lantern size to 12×10 in the large size. The rack is perfectly rigid, has no loose pieces, folds flat, and is most easily fixed to required size.



HINTON'S PATENT MOUNTING AND SQUEEGEEING BOARD.

LEAVES BOTH HANDS FREE FOR
SQUEEGEEING.

ENSURES EVEN PRESSURE.

PROTECTS PRINTS AGAINST
TEARING.

ALWAYS READY FOR USE.

This piece of apparatus has been designed to facilitate operations of squeegeeing, mounting, and rapid drying of photographic prints. It consists of a strong flat board, to which are attached, in such a manner as to be easily removable, several sheets of tough, fibrous blotting boards, protected by a cover of strong rubber sheeting.

PRICES.

No. 1	To take 10×8 (or smaller) Squeegeeing Sheets	...	...	6/-
No. 2	" 14×10 "	...	...	10/-
No. 3	" 18×14 "	...	...	17/6

Each packed with full directions and Two Ferrotype Squeegeeing Sheets in box.

Send for Hinton's Photographic Price Lists.

[See preceding and following pages.]

HINTO-KINONE**HINTO-KINONE**

(TITLE REGISTERED.)

A CONCENTRATED DEVELOPER

For PLATES, FILMS, and PAPERS.

The Best of All!**The Cheapest of All!****The Cleanest of All! The Most Compact of All!**

In a trying Climate HINTOKINONE will keep Good for Years.

90 DEGREES in the SHADE, and **40 DEGREES** below ZERO.

EUROPE.—From ALFRED T. COOK, Surveyor, Worthing:—"I found your HINTOKINONE most satisfactory in Finland during the severe winter of 1892-93, the thermometer registering 40 degrees below Zero F."

ASIA.—From Colonel E. MOCKLER, H.B.M. Consul-General, Bagdad:—"I shall feel obliged by your sending me another 28/6 case of your HINTOKINONE Developer. I have found it to be an excellent developer, and well under control."

AFRICA.—From W. V. TANNER, Esq., Vice-Consulate, Opobo:—"HINTOKINONE appears to be a most satisfactory developer for hot climates, as it is as good as ever, although the temperature is frequently over 90 degrees F."

AMERICA.—From E. R. ANSON, Esq., Morawhanna, British Guiana:—"Please send me another dozen 5-ounce bottles of HINTOKINONE. It keeps admirably here, and I always use it for my negatives."

AUSTRALASIA.—From ALFRED HAY, Esq., Boomanoomana Mulwala, New South Wales:—"Please send me three large bottles of 'HINTOKINONE.' I am very much pleased with it."

Hintokinone is sold in 5-ounce and 10-ounce square, glass-stoppered Bottles. The 5-ounce size will make $2\frac{1}{2}$ pints of Developer, price $\frac{1}{3}$, post free, $\frac{1}{8}$; the 10-ounce size will make 5 pints of Developer, price $\frac{4}{3}$, post free, $\frac{5}{-}$. For export, in Zinc-lined Boxes of 1 doz. 5-ounce bottles, $\frac{8}{6}$, $\frac{54}{-}$ for the 10-ounce size.

HINTO-KINONE**CARTRIDGES**

(Title Registered.)

FOR DEVELOPMENT OF ALL MAKES OF PLATES, FILMS, LANTERN SLIDES, BROMIDE AND GASLIGHT PAPERS.**12/3 per Box of Six and bottle. Post Free, 2/6.**

EACH CARTRIDGE MAKES 8 to 10 ounces of Developer ready for immediate use, or CONTENTS OF ONE CARTRIDGE may be dissolved in the bottle provided, forming a Concentrated Developer which will keep many months, and any quantity of which may be diluted as required for use.

CLEAN, RELIABLE, DOES NOT STAIN THE FINGERS, KEEPS WELL IN AND IS SUITABLE FOR ALL CLIMATES.

**OF ALL . . .
PHOTO DEALERS.**

*Sole Inventors**and Makers:*

HINTON & CO
38 BEDFORD STREET
STRAND, W.C.

PURCHASE ALL YOUR REQUIREMENTS AT WHOLESALE PRICES.

SMEDLEY & CO.

Photo Apparatus and Material Manufacturers



SPECIALITIES:—

Studio Cameras.
Outdoor Cameras.
Backgrounds.
Photo Accessories.
Lenses.

Enlarging Lanterns.
Magic Lanterns.
Hand Cameras.
Chemicals, &c.
Plates, Paper, &c., &c.

Photo Works, Show Rooms, and Offices:
FLEMING SQUARE, BLACKBURN, ENGLAND.

See following pages.

TERMS.

All foreign orders must be accompanied by remittance—P.O.O. or draft on London Bankers.

PACKING.

Experienced packers are employed, and every care is exercised to ensure the safe and speedy transit of goods. Packing cases are charged at half cost price, and are not returnable.

APPROVAL.

Any of our goods will be sent on approval on receipt of cash to value of order as deposit. This will be returned in full if goods are not satisfactory, but it must be fully understood that, in this case, the goods must be returned within *three days from receipt*.

For the convenience of customers abroad, we undertake to supply goods of any kind or make they may require at traders' prices.

DESPATCH.

All orders are despatched in rotation where possible, but in the case of goods required for shipment abroad, we make special efforts to despatch by next mail after receipt of order. Lenses and extras of any kind are fitted to our apparatus "free of charge," and we invite our customers to send the whole of their orders to us, as we hold a large and varied stock of lenses of every kind and make, and are therefore able to supply everything necessary, and complete orders without delay.

DISCOUNT.

A discount of five per cent. is allowed off all our goods for cash with order. Cheques, drafts, and P.O.'s should be made payable to SMEDLEY & Co., and crossed 'Mercantile Bank of Lancashire,' Blackburn, England.

SMEDLEY & CO., Blackburn, ENGLAND.

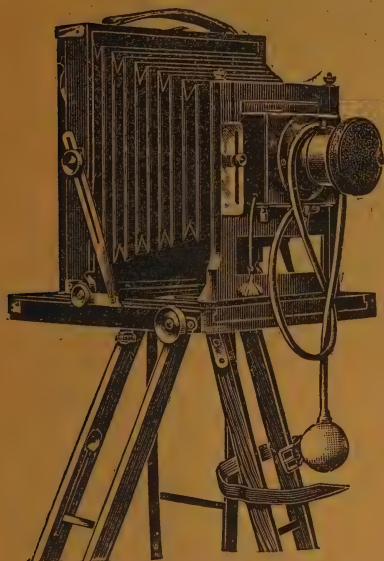
Offices, Show-rooms, & Works: 22, Fleming Square.

Our Popular Outfit.

A MARVEL OF CHEAPNESS.

Beyond Rivalry.

Far ahead of all others both in quality and price.



Comprises splendidly made and finished Camera with all movements, is complete with 1 double slide, rapid rectilinear lens of good quality, with Iris diaphragms, best quality Time and Instantaneous Shutter (behind lens pattern), turntable, and 3-fold tripod stand.

NOTE THESE PRICES.

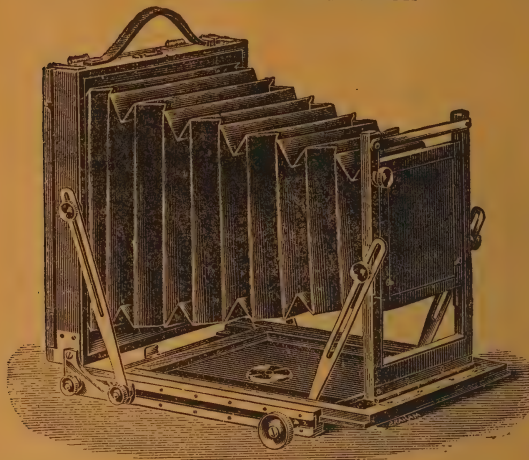
	6½×4½	9½×6½	10×8	12×10	15×12
	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
With square or oblong waterproof lock-up case extra	3 0 0	5 0 0	7 0 0	8 15 0	11 15 0
Solid leather lock-up case	0 8 6	0 10 6	0 13 6	0 15 0	0 13 6
Extra dark slides, book form and best quality	0 18 0	1 4 0	1 12 0	2 0 0	2 10 0
	0 8 6	0 12 6	0 17 6	1 5 0	1 15 0

Five per cent. discount for cash with order.

THE PHOTO STORES, BLACKBURN.

The IMPROVED Up-to-Date Camera.

NEW PATTERN.



The finest out door Camera made. In daily use by thousands of Photographers throughout the world.

THIS Camera has been greatly improved, and is now, without doubt, one of the finest on the market at the price. It has every movement a camera can possess—long extension, extreme rise of front, double swing and reversing back, sliding set-up motion for wide-angle lenses, &c. It is built throughout of finest mahogany and fitted with best leather bellows; it folds into very small compass, and is extremely rigid, even when used at very long extension. It is the lightest and most portable camera made consistent with strength, and, as the front is well supported, it will carry lenses of any size.

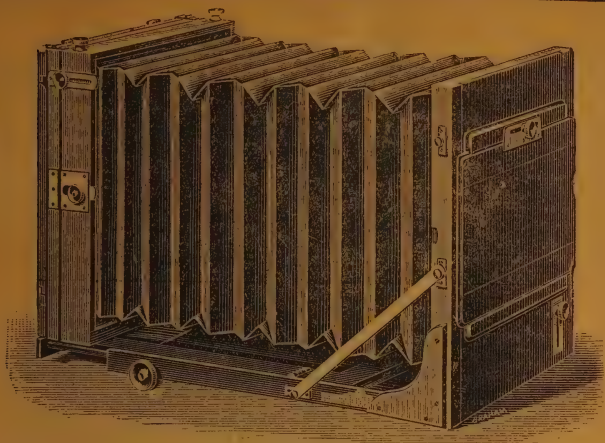
In the half and whole-plate sizes the Camera can be supplied with larger front, to allow of the use of Stereoscopic Lenses, at an extra cost of 10s.

PRICES.

	$6\frac{1}{2} \times 4\frac{1}{2}$	$8\frac{1}{2} \times 6\frac{1}{2}$	10×8	12×10	15×12
	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
The UP-TO-DATE CAMERA and three double slides	6 0 0	7 10 0	9 19 6	12 15 0	15 15 0
Rapid Rectilinear Lens of finest quality, with Iris diaphragms	2 0 0	3 3 0	4 0 0	4 15 0	6 10 0
Finest quality three-fold Tripod Stand	0 17 6	0 17 6	1 1 0	1 7 6	1 17 6
Solid Leather Camera Case, with lock and key, either oblong or square pattern	1 1 0	1 10 0	1 15 0	2 0 0	2 15 0
Extra if Camera is fitted with Turntable	9 3 6	12 0 6	15 6 0	18 2 6	23 2 6
Extra if Camera and Slides are brass bound	0 15 0	1 2 6	1 2 6	1 5 0	1 5 0
	1 0 0	1 2 6	1 2 6	1 5 0	1 7 6

Five per cent. discount for cash with order.

THE PHOTO STORES, BLACKBURN.



No. 4. Long Extension Camera.

Parallel Bellows, made of the finest quality Spanish mahogany, fitted with improved swing, check screws to all milled heads, reversing frame, spring catch to holder, vertical and horizontal, sliding fronts with brass slots, patent plate screen, backs fitted with our special spring fastenings. Price includes three Double Backs.

Size.	Price			Extra Back.	Brass	Aluminium	Focal
	£	s.	d.	each.	binding	fitted.	length.
4½ × 3¼ ...	6	15	0	15/9 ...	27/- ...	34/6 ...	—
6½ × 4½ ...	8	12	6	20/3 ...	27/- ...	39/- ...	18 in.
8½ × 6½ ...	10	5	6	24/- ...	33/- ...	45/- ...	22 "
10 × 8 ...	12	18	0	28/6 ...	36/- ...	52/6 ...	26 "
12 × 10 ...	16	10	0	36/- ...	39/- ...	64/6 ...	30 "
15 × 12 ...	20	5	0	48/- ...	45/- ...	75/- ...	36 "
18 × 16 ...	32	5	0	75/- ...	60/- ...	— ...	42 "
24 × 18 ...	48	7	6	114/- ...	90/- ...	— ...	54 "

Half-plate and whole-plate cameras can be fitted with Stereo Bellows Division for 10/- extra. Adapter Repeating Backs can be fitted for Studio work for 30/- extra, made to fit any slide; or Slides supplied for Studio work, whole-plate size, 15/- each.

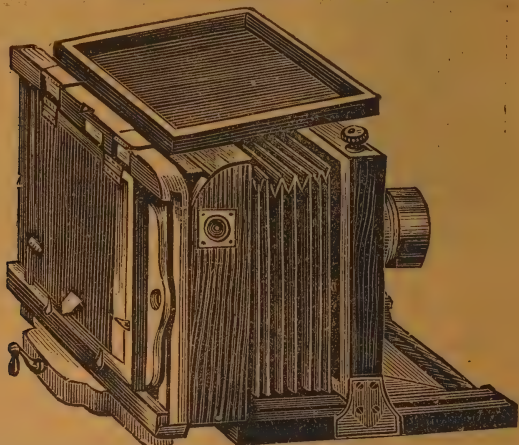
Five per cent. discount for cash with order.

THE PHOTO STORES, BLACKBURN.

— THE —

UNIVERSAL STUDIO CAMERA.

LOOK AT THIS AND READ THE DESCRIPTION, AND THEN COMPARE
WITH OTHERS BY WELL-KNOWN MAKERS.



A FIRST-CLASS INSTRUMENT AT A LOW PRICE.

Will last a lifetime, and do all the work required in a Studio—Copying, Enlarging, Reducing, &c., &c.

THE instrument is built of finest mahogany, and has all the necessary movements. It extends forwards along the base and backwards by means of endless screws, or rack and pinion, as may be desired. It is fitted with leather bellows of the finest quality; has rising and falling front, swing back, and repeating back for two C. de V.'s on $\frac{1}{4}$ -plate, two Cabinets on whole plate, two Boudoirs on 10×8 , and two small Panels on 12×12 . It is fitted with inner frames for all sides singly, and is complete with slide (as illustration), this slide being fitted with reversible carrier down to $\frac{1}{4}$ -plate. It is also fitted with lens-screens, extending 15 inches in front of Camera or more, if desired, and with inside safety shutter of best quality.

PRICES	...	$\frac{1}{4}$ -plate size	...	...	...	£6	0	0
	...	Whole-plate size	...	...	...	7	0	0
	...	10×8 size	...	...	...	8	10	0
	...	12×10 "	...	...	...	10	10	0
	...	15×12 "	...	...	...	12	0	0

BEAR IN MIND THAT THESE PRICES INCLUDE FITTING SHUTTER, LENS-SCREENS, &c.
NO EXTRA CHARGE BEING MADE FOR FITTING.

**Great care is exercised in finishing these Cameras, and all
is guaranteed to be in perfect register.**

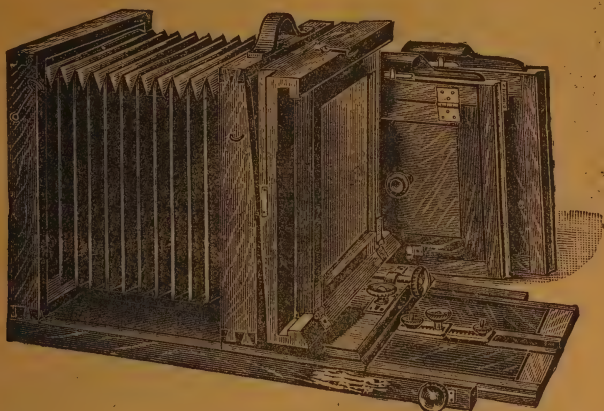
Customers should state, when ordering, the size of shutter required, and also whether it should be fitted inside Camera, as many people prefer to use it on hood of lens.

Five per cent. discount for cash with order.

THE PHOTO STORES, BLACKBURN.

The Ideal Camera

That commends itself at sight, answers all purposes in Studio, including Enlarging, has an extension of 4 feet. Any lens can be used, down to one of 4 in. or 5 in. focus. It has two slides, each fitted with carriers for smaller sizes; the Camera repeats for all sizes, *i.e.*, two cards on



cabinet, or two cabinets on whole-plate. In this size (whole-plate) one of the slides carries two half-plates side by side. It is made in two sizes only:—

Whole-plate = = = £5 0

12 × 10 = = = 7 10

This Camera can be had in walnut with nickel fittings, instead of mahogany with brass fittings, for 15 per cent. extra.

Five per cent. discount for cash with order.

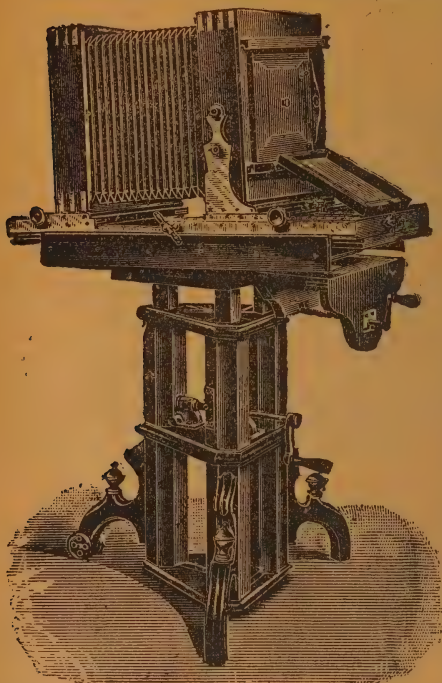
THE PHOTO STORES, BLACKBURN.

THE IMPROVED "NEWMARKET" STUDIO CAMERA AND STAND.

Camera and Stand built throughout of Solid Mahogany.

WE beg to introduce to you one of the handsomest and most efficient Cameras ever constructed. This Camera is built of solid mahogany. It takes all sizes from $\frac{1}{4}$ -plate to 15×12 . Is complete with

one large 15×12 roller blind shutter and carriers for 15×12 , 13×8 , 12×10 , and 10×8 . It is also fitted with adapter repearing back for smaller sizes. Complete with smaller slide, fitted with carriers from $\frac{1}{4}$ -plate to $\frac{1}{2}$ -plate, which are reversible, so that two cartes can be taken on $\frac{1}{4}$ -plate, &c., &c., and complete with three extra frosts, taking all size lenses to 8 in. flange. Allows use of lenses down to 6 in. or 8 in. focus, with extension to $4\frac{1}{2}$ ft., with patent arrangement to prevent bellows from bagging, whether used for long or short extensions. It has swing back every way, double rack arrangements back and front, extending baseboard (as illustration). The whole surmounted on a handsome ebonised stand, with massive



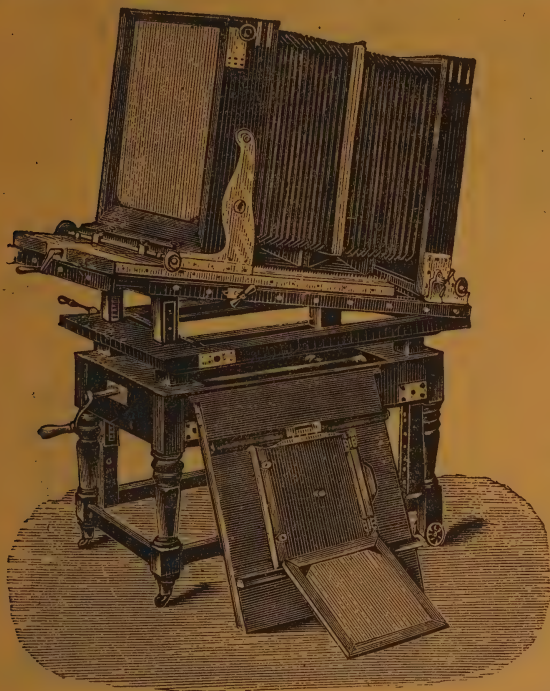
pillars and carved claw feet. Splendid canting arrangement, &c. Musical box in base. We are the only people in the world who can supply this efficient instrument at the price. Made in our own workshops. Surpasses all imitations, and far cheaper.

Supplied in Two Sizes. 12×10 , £22 10s.; 15×12 , £25.

Five per cent. discount for cash with order.

THE PHOTO STORES, BLACKBURN,

The "NEW MODEL" STUDIO CAMERA



This Camera has the same movement as our "New-market," and is only supplied in larger sizes.

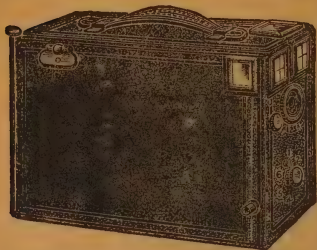
PRICES.

20 × 16	Camera with one slide, and complete with set of carriers and inside bellows shutter	... ..	£35
24 × 20	Do. do. do. do.	... ..	£41

Five per cent. for cash with order.

THE PHOTO STORES, BLACKBURN.

The "CARLTON" Hand Camera.

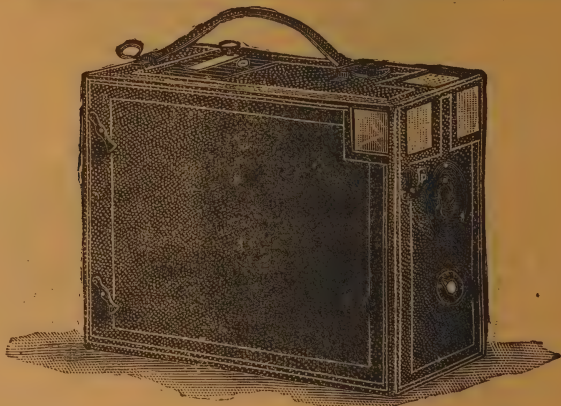


THIS Hand Camera carries six plates, size $2\frac{1}{2} \times 2$, which are changed automatically. It is fitted with achromatic view lens of good quality, with stops, and is complete with time and instantaneous shutter and finder.

Price 4s. each only.

The "WAVERLEY" Hand Camera.

Best
value
for
money
in
the
Trade.



THIS Hand Camera carries twelve quarter-plates, changing automatically, and is covered in leather. It is fitted with finest quality lens and shutter, giving variety of speeds in instantaneous and also time exposures. There are two brilliant finders, and register for the number of plates exposed.

Price, with single lens	...	...	...	...	£0 15 0
" " R R. "	...	...	...	...	1 15 0

Five per cent. discount for cash with order.

SMEDLEY'S PHOTO STORES, BLACKBURN, ENGLAND.



The "BEACH."

An entirely British Made Camera.

The "BEACH" Magazine Hand Cameras.

No trip to the Seaside is complete without the "Beach."

A Wonderful Guinea, and Twelve & sixpence worth.

The two view finders are accurate, and give the same view as you will get on the negative.

Iris Diaphragms are provided, and a first-class Lens.

There is a Time and Instantaneous Shutter, which you cannot reset until the last plate exposed has been changed and indicated. The one motion changes the plate, and resets the shutter for next exposure.

You can't take two pictures on the same plate if you try to do so.

There is no Camera with such a reliable action at present on the market.

Well covered in Leatherette, with a good stitched leather handle. Weight $1\frac{3}{4}$ pounds. The shutter has three speeds.

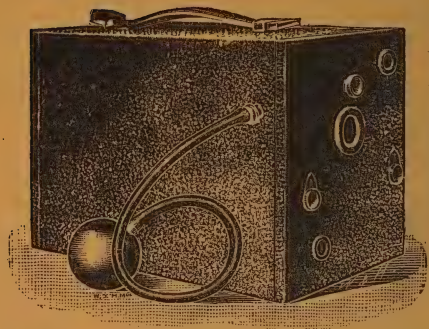
Magazine for 12 quarter plates - £1 1s. Od.

" " 6 " " " - £0 12s. 6d.

Five per Cent. Discount for Cash with Order.

The "Automatic" Hand Camera

(PATENT APPLIED FOR).



PRICE £2

Postage

6d. extra.

THE Object of this Invention is a Hand or Magazine Camera, which, by one simple movement by the operator, shall suffice to expose a Plate or Film, change same, and set Shutters for next exposure. It is therefore impossible to expose a Plate twice, or to change a Plate without exposing it, which is a very common occurrence with ordinary Hand Cameras. It has been the aim of Inventors for years to bring out a Camera with ONE movement only, and this object has been fully realised in the above Camera. On referring to the Illustration, it will be seen that there are three milled nuts; the one over the Lens is for adjusting the Diaphragms, of which there are three; the nut to the right is for altering the Shutter from Instantaneous to

Five per cent. discount for cash with order.

THE PHOTO STORES, BLACKBURN.

The "Automatic" Camera—*continued.*

Time, and *vice-versâ*; the nut to the left of the Camera is the speed regulator. The small eyelet at bottom is the Automatic Indicator of Plates exposed. The Camera is fitted with good Single Achromatic Lens, covered in best grained leather, with strong handle. The Pneumatic Ball and Tube detaches for convenience of carrying.

Note the following—

You squeeze the Ball ONCE
 It takes the Photo It Changes the Plates
 It Sets the Shutter It Registers the Exposed
 Plates

By ONE Movement Only.

IN FACT, you can expose the whole of the
 12 Plates in 7 seconds—a feature impossible
 in any other Camera.

The Camera holds 12 Quarter-Plates, or 24 Quarter-Films. Films and Plates can be used either separately or mixed. Why buy a Camera with 3 or 4 movements to mix you up and make you use bad words? Intending buyers should give the above their serious consideration.

SIZE OF CAMERA— $8\frac{1}{2} \times 5\frac{3}{4} \times 5$. WEIGHT—2 LB. 8 OZ.

PRICES NET, with

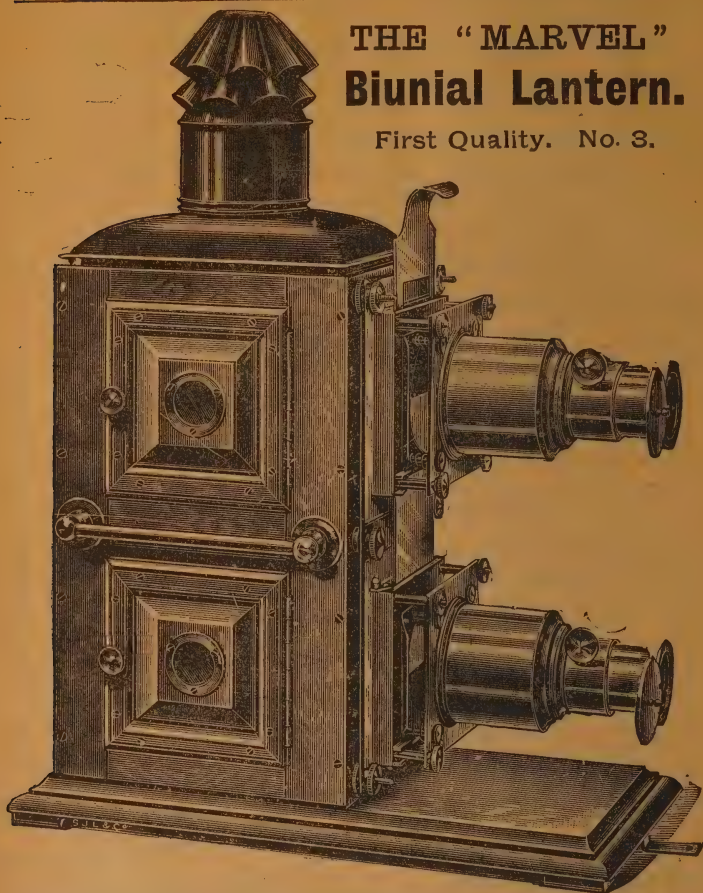
SINGLE LANDSCAPE LENS	...	£2	0	0
R.R. LENS, IRIS STOPS	...	3	16	0
BEST QUALITY EURYSCOPE, f6		4	0	0
T.T. & H.D.D. LENS, IRIS	...	4	15	0

Five per cent. discount for cash with order.

THE PHOTO STORES, BLACKBURN.

THE "MARVEL" Biunial Lantern.

First Quality. No. 3.

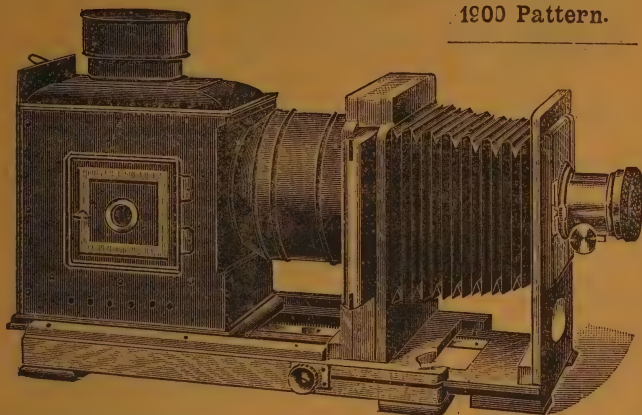


First Quality Mahogany or Walnut Body, elegantly finished and polished, on £ s. d.
heavy foot, with brass rails, lined tin, with best japanned Tin Dome, and
Rose Top, 4 panelled and moulded doors with brass sight holes. The
whole Front is in first-class style, all heavy brass, best finish,
with Curtain Diaphragm, 4 in. Compound Condensers, and first quality
Double Achromatic Objectives (guaranteed to give a perfectly flat field) in
heavy mounts, double pinion heads, flashing shutters, and slots for tinters **6 6 0**
Ditto, ditto, fitted with Jackets and pair Interchangeable Lenses (any focus, same price).
Five per cent. discount for cash with order.

THE PHOTO STORES, BLACKBURN.

. . OUR NEW . .
Cantilever Enlarger
LEADS THE WAY!

1900 Pattern.



OUR NEW PATTERN CANTILEVER ENLARGER is positively the best and cheapest in the market; constructed on the best principles; made in Mahogany or Walnut; easy focussing arrangement; Leather Bellows, &c.

SIZES AND PRICES AS FOLLOWS:—

Half-plate, with 8-inch Condenser and Oil Lamp complete	£5 5 0
Half-plate, with 8-inch Condenser and Incandescent Gas ...	5 10 0
Whole-plate, with 10-inch Condenser and Oil Lamp... ..	7 15 0
Whole-plate, with 10-inch Condenser and Incandescent Gas...	8 5 0

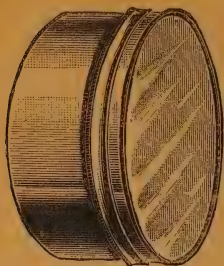
If fitted with rack and pinion and woodwork polished, 20s. extra.

Best Quality Objectives with Rack and Pinion and yellow glass cap.

Half-plate	...	£2 0 0	|	Whole-plate	...	£3 10 0
------------	-----	--------	--	-------------	-----	---------

Five per cent. discount for cash with order.

THE PHOTO STORES, BLACKBURN.



CONDENSERS.

— o —

FINEST quality Plano-convex
Condensers, mounted in Brass
Oxydised Mounts.

4 inch size	£0	7	6	7 inch size	£2	0	0
4½ „	0	12	6	8 „	2	10	0
5 „	1	0	0	9 „	3	7	6
5½ „	1	7	6	10 „	4	10	0
6 „	1	10	0	11 „	5	10	0
6½ „	1	15	0	12 „	8	15	0

Five per cent for cash with order.

FOCUSSING CLOTHS.

— o —

Lined with red sateen, with elastic band to fit
over lens.

Half-plate, **3/6** Larger size, **5/6** each.

Special quality waterproof cloth, everlasting
wear. Professional: small size, **3/6**; medium,
5/6; large, **7/6** each.

Five per cent. discount for cash with order.

SMEDLEY & CO., Fleming Sq., Blackburn, England.

THE "PERFECTO"

Nickel-plated Steel Camera Stand.

THE "Perfecto" Camera Stand is a sine qua non where quick accurate work is desired. It is of the usual Tripod Design, manufactured of Nickel-plated Tempered Sheet Steel, with carefully rivetted hinged joints. Each leg consists of three telescopic rods, of which the necessary fitting is accurate, and of which the design of the cross section ensures remarkable strength.

The Rods are adequately secured at any required height by a special neat and effective Clamp, actuated by Fly Nuts of proper proportions, turning on hard-threaded Screws, the whole forming a joint so strong that there is no fear of slipping, even under the heaviest Camera.

The Head is fitted with a Ball and Socket Joint, and is therefore capable of adjustment, so that the Camera may be rapidly levelled in rough ground, hill-side, &c., occasions without any troublesome manipulation of the Legs.

The "Perfecto" Camera Stand is absolutely the strongest and cheapest Camera Metal Stand in the Market. Its capacity to withstand rough usage is unequalled and it is strongly recommended for use in Greater Britain and in the Tropics.

The "Perfecto" Camera Stand is superior to the usual aluminium stand, inasmuch as it is not liable to denting, with the consequent difficulty of closing, and that the method of securing the joints is more positive and reliable, while it is equal to aluminium as regards appearance and in compactness.

The "Perfecto" Camera Stand is infinitely superior to any wooden stand, inasmuch as there are neither parts to warp nor screws to become loosened, nor is there any varnish to become sticky; further, the "Perfecto" is less bulky, lighter, more compact, incomparably stronger, and more rigid.

The "Perfecto" Camera Stand weighs 26 ozs.; measures 20½ inches folded, and 4 ft. 7½ ins. extended. It is a thoroughly well-finished high-grade stand, and is suited to every kind of Hand Cameras, Folding Hand Cameras, and, in fact, any Camera for which an Aluminium Stand has hitherto been used.

The "Perfecto" Camera Stand is, by reason of its immense strength, compactness and power of resistance to hard and rough usage, particularly indicated for use by Cyclists, Tourists, and by all who desire a Camera Stand capable of doing the best work at a price usually obtaining for a stand of a very inferior type.

Price 12s. 6d. each.

Packed in light and strong Leatherette Case, with Straps for carrying,
2s. extra, less 5 per cent. for cash with order.



"PERFECTO" ADJUSTABLE HEAD.

Five per cent. discount for cash with order.

THE PHOTO STORES, BLACKBURN.

❖ TRIPOD STANDS. ❖



Four-fold, very light, and folding
up to 16 ins. Height, 54 ins.

Price 17/6

A first-class three-fold Stand, has self-locking joint. Made in all sizes.

No. 1, suitable for quarter or half-plate Camera ... 17/6

„ 2 „ half or whole-plate „ ... 17/6

„ 3 „ 10 by 8, or 12 by 10 „ ... 25/-

„ 4 Very massive, with 10 in. top, and fitted
with rule joint. Absolutely the finest
Stand made for carrying large Cameras 35/-

Aluminium Stand, with tri-
angular legs, folds up very
small, bright or black, 25/-



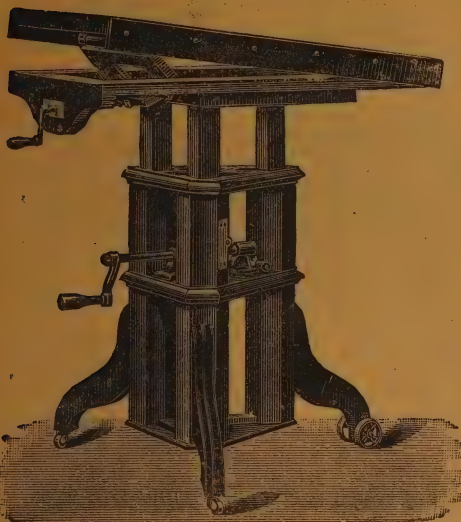
Five per cent. discount for cash with order.

SMEDLEY & CO, Fleming Sq., Blackburn, England.

THE 'ROYAL' STUDIO STAND

Is the very Acme of Perfection.

IS suitable for a camera of any size and weight, and has sliding table top, giving four and a-half feet of extension.



It is fitted with a most durable tilting arrangement and Archimedean screw by means of triple cogs, thus relieving the operator of much exertion in winding. It can be raised to four and a-half feet, and lowered to three feet; is built of **solid walnut or mahogany**, and can be moved about the studio as easily as a portable tripod stand.

It is exceedingly well made, and will last a lifetime. It is extremely rigid, even when raised to its highest point.

Width of top: 15 in., or less if desired.

We might state that the stand is a most elegant one and has only to be seen to be appreciated.

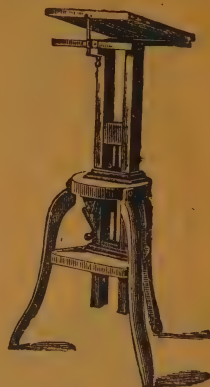
PRICE - - £7 10 0

Five per cent. discount for cash with order.

THE PHOTO STORES, BLACKBURN.



STUDIO STAND.



A REALLY good serviceable Stand, suitable for all size Cameras up to Whole-plate. Made of seasoned hard wood; has tilting table, and is polished mahogany colour. Price £2 10s. Made of solid mahogany and stouter material with larger top, 20s. extra.

SQUEEGEES.

Best quality, with Solid Rubber Roller.

6 inch size...	...	2/-
8 ,, ...	...	2/6
10 ,, ...	...	3/-
12 ,, ...	...	4/-

READING GLASSES.

Great magnifying power, for retouching.

3 inch size	...	2/- each.
3½ ,, ...	...	2/6 ,,
4 ,, ...	...	4/- ,,

Five per cent. discount for cash with order.

SMEDLEY & CO., Fleming Square, Blackburn, England.

STUDIO STANDS.

No. 2452 (Fig. 251).



No. 251.

Made of polished pine, one double foot-roller, the upper baseboard moving by an eccentric, the lower one having an extension.

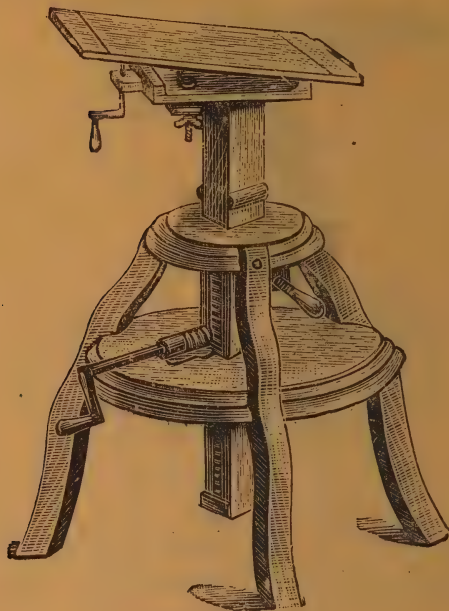
Suitable for Cameras up to 12 x 10.

Price £3 10 0.

Five per cent. discount for cash with order.

THE PHOTO STORES, BLACKBURN.

POLISHED PINE STUDIO STAND.



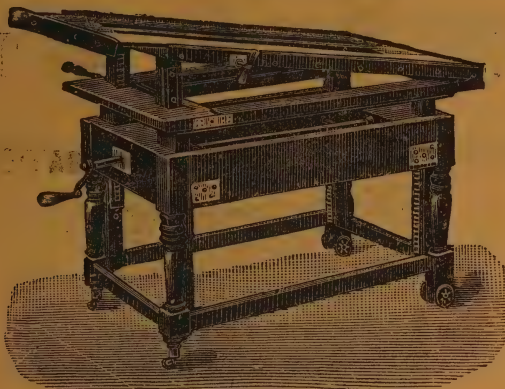
A thoroughly good and serviceable Stand for the studio
at a moderate price.

Suitable for whole-plate Camera	..	..	£2 10 0
For 12 x 10 Camera	..	..	4 0 0

Five per cent. discount for cash with order.

THE PHOTO STORES, BLACKBURN.

The 'IDEAL' Camera Stand.



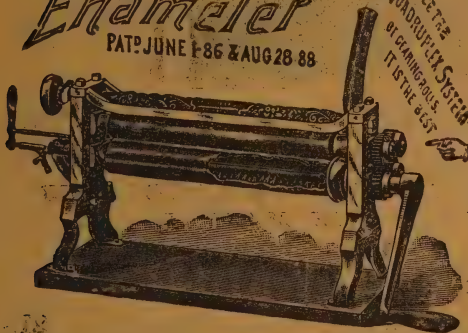
Racks down to 2 ft. 6 in., and up to 4 ft. A stand that commends itself to every photographer, and is indispensable when photographing children.

Size of top, 20 × 15 ins., price £8.

Size of top, 30 × 20 ins., £9 10s.

THE GLOBE Enameler

PAT. JUNE 1886 & AUG 28 88



NOTICE—
THE
QUADRUPLEX SYSTEM
OF CRANKING—
IT IS THE BEST

THE finest machine
in the world.

Never sweats; heats in two minutes; can be kept at one heat for an indefinite period; and gives a surface equal to collodion enamel.

PRICE	10 in. size	...	...	...	...	...	£5	15	0
	15 in. size	...	...	...	...	...	7	7	0

Less 5 per cent. discount for cash with order.

THE PHOTO STORES, BLACKBURN.

THE "PERFECT" STUDIO BELLOWS SHUTTER.

ABSOLUTELY SILENT. NO VIBRATION.



Even Exposure over the whole of the Plate,

AND IS

**THE MOST DURABLE SHUTTER EVER
PUT ON THE MARKET.**

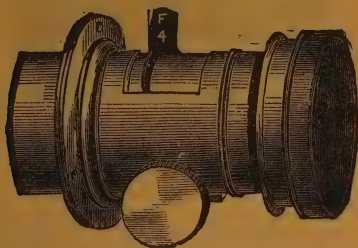
SEE OUR PRICE.

Any size to 4in. ...	...	...	...	...	...	21/-
" " " 5in. ...	...	...	...	...	...	25/-
" " " 6in. ...	...	...	...	...	...	30/-

[Less five per cent. discount for cash with order.

THE PHOTO STORES. BLACKBURN.

SMEDLEY'S PORTRAIT LENSES.



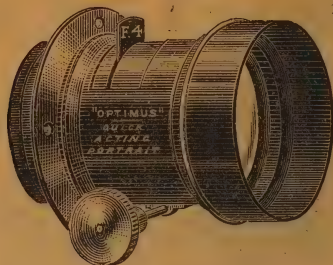
THESE Lenses are of really first-class type, and are fully equal to those by any other maker working at the same intensity. They work at f 4, and give extremely fine definition together with relief, whilst they have a very flat field. For rapid work in the Studio they are unsurpassed.

Plate covered.	Approx. Equiv. Focus.	Price with Waterhouse stops.
$\frac{1}{4}$ -plate	$5\frac{1}{2}$ inches	£1 10 0
$\frac{1}{2}$ "	8 "	2 10 0
$\frac{1}{1}$ "	12 "	5 10 0

LARGER SIZES TO ORDER.

Five per cent. discount for cash with order.

THE PHOTO STORES, BLACKBURN.



WE are Special Agents for these renowned Lenses, and always hold a big Stock of them; thus we are enabled to fit to our Cameras and supply without delay.

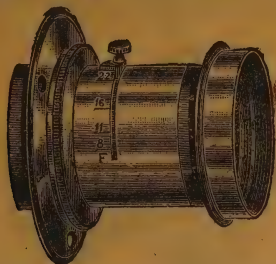
They are made by Perken, Son, & Co. expressly for us. It is of slightly less rapidity than the B Series, though of equal quality. Nothing made to equal it for the money.

Size to cover...	$\frac{1}{4}$ -plate.	Cabinet.	Whole-plate.
Focus	5 ins.	6 ins.	12 ins.
Price	£2.10	£4	£6

Five per cent. discount for cash with order.

THE PHOTO STORES, BLACKBURN.

SMEDLEY'S Photographic Lenses.



Rapid Rectilinear Series.

THESE lenses are of the very finest quality, and will compare most favourably with lenses of similar type by the best London makers which are sold at about three times the price. It was with one of these famous lenses that Mr. Marshall, of Henley-on-Thames, produced two of the finest instantaneous pictures ever exhibited, and many photographers have them in daily use for all outdoor work. They are most suitable for groups, landscapes and architectural work.

Plate covered.	Equiv. Focus.	Price with Iris or Waterhouse Diaphragms.
5 × 4... ..	5½	£1 15 0
7 × 5... ..	8½	2 0 0
9 × 7... ..	13	3 3 0
10 × 8... ..	16	4 0 0
12 × 10... ..	18	4 15 0
15 × 12... ..	22	6 10 0

Also supplied in cheaper quality at following prices:—

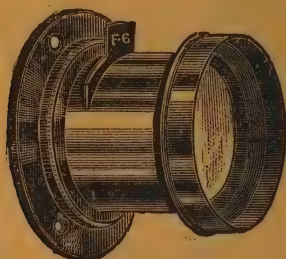
Size.	Focus.	Price with Iris Diaphragms.
5 × 4... ..	5½	7/6
7 × 5... ..	8½	12/6
9 × 7... ..	13	25/-
10 × 8... ..	16	35/-
12 × 10... ..	18	47/6
15 × 12... ..	22	65/-

Larger or intermediate sizes can be supplied to order at proportionate prices.

Five per cent. discount for cash with order.

THE PHOTO STORES, BLACKBURN.

Smedley's Universal Lenses.



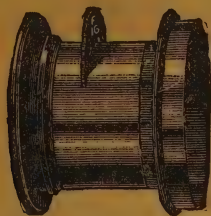
THESE Lenses working at $f/6$ have double the rapidity of the rectilinear series, and they give perfect definition at open aperture to the very edges of the plates they are registered to cover. They fulfil every requirement both for studio and out-door work, being extremely rapid, and have great depth of focus.

Plate Covered.	Approximate Equivalent Focus	Price with Ir's or Waterhouse Diaphragms.
5 × 4	6 inches	£2 5 0
7 × 5	9 „	3 10 0
9 × 7	13 „	4 15 0
10 × 8	15 „	5 5 0
12 × 10	17 „	8 10 0
15 × 12	20 „	12 0 0

Five per cent. discount for cash with order.

THE PHOTO STORES, BLACKBURN.

SMEDLEY'S WIDE ANGLE RECTILINEAR LENSES



THESE Lenses are specially adapted for Photographing in confined situations, viz., Interiors, Machinery, Buildings, &c. They are remarkable for their freedom from distortion and immense covering power.

Size of Plate Covered.	Approx. Equiv. Focus.	Rotating Diaphragms.	Iris.
5 × 4 ...	4-in. ...	£1 10 0 ...	£1 15 0
7 × 5 ...	5 „ ...	2 10 0 ...	2 15 0
9 × 7 ...	6 „ ...	3 15 0 ...	4 0 0
10 × 8 ...	7 „ ...	4 5 0 ...	4 10 0
12 × 10 ...	8 „ ...	4 10 0 ...	4 15 0
15 × 12 ...	9½ „ ...	5 0 0 ...	5 10 0

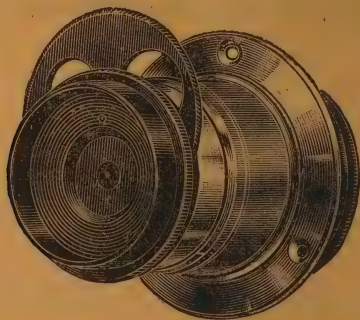
Larger Sizes at proportionately low prices, or can be made to any focus desired.

Less five per cent. discount for cash with order.

THE PHOTO STORES, BLACKBURN.

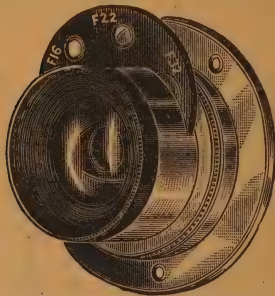
S M E D L E Y'S

View and Landscape Lenses



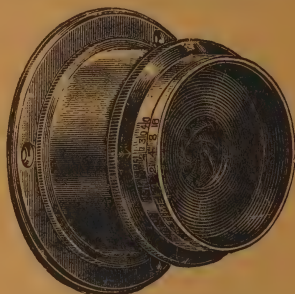
With Sliding Mount and Rotating Stops.

No. 101. $\frac{1}{4}$ -plate, 7/6	No. 104. 10×8 ,	No. 107. , 27/6
„ 102. $\frac{1}{2}$ -plate, 15/-	„ 105. 12×10 ,	„ 108. , 35/-
„ 103. $\frac{1}{4}$ -plate, 20/-	„ 106. 15×12 ,	„ 109. , 40/-



**WITH FIXED MOUNT
and ROTATING STOPS.**

No. 110. $\frac{1}{4}$ -plate ...	5s. 0d.
„ 111. $\frac{1}{2}$ -plate ...	10s. 0d.
„ 112. $\frac{1}{4}$ plate ...	15s. 0d.



**SPECIAL QUALITY,
WITH IRIS DIAPHRAGMS.**

No. . $\frac{1}{4}$ -plate ...	9s. 6d.
„ . $\frac{1}{2}$ -plate ...	17s. 0d.
„ . $\frac{1}{4}$ -plate ...	25s. 0d.

Other sizes supplied to order.

Five per cent. discount for cash with order.

THE PHOTO STORES, BLACKBURN.

Studio Accessories.

THE IDEAL

= = Background Stand.

Fig. 133.

Patent applied for.
Latest and Best as well as the Cheapest.



Fig. 133.

This Stand has many good features, and being moderate in price will fill a long-felt want. It can be adjusted instantly to any height, making it suitable for all classes of backgrounds. The grounds can be exchanged quickly, and provision is made for the storage of 6.

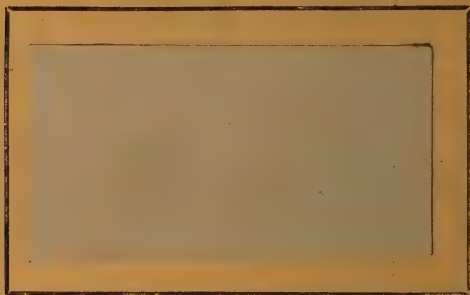
Price of Stand (taking 8 ft. grounds) and 3 rollers..... £5 0 0
Extra rollers, 7/6 eachper set of 3 1 1 0

Less Five per cent. discount for cash with order.

THE PHOTO STORES, BLACKBURN.

Double-faced White Rubber Sheeting

FOR BACKING-UP PRINTING FRAMES,
SQUEEGEEING, &c.



This Rubber far supersedes blotting-paper, &c., for backing-up printing frames. It enables you to print under any condition of weather, does not absorb moisture to spoil your prints, but resists it, and lasts a lifetime. Printing frames never require replenishing.

It is invaluable to careful and economical workers, and absolutely indispensable in platinotype printing.

For squeegeeing also it is a time and money saver. One single piece can be used for years. No fluff left on the prints, and a perfect surface obtained.

— PRICES —

SIZE.	S.	D.	SIZE.	S.	D.
$\frac{1}{4}$ -plate, per doz. -	0	6	10×8 , per doz.	3	9
$\frac{1}{2}$ -plate ,, -	1	0	12×10 ,, -	5	0
$\frac{3}{4}$ -plate ,, -	2	0	15×12 ,, -	7	6

Five per cent. discount for cash with order.

THE PHOTO STORES, BLACKBURN.

BACKGROUNDS.

The Cheapest and Best on Earth.

ANY OTHER DESIGN PAINTED TO ORDER AT SAME PRICES.



501.



502.



503.



504.

These Backgrounds are entirely new in design, and are of the best quality. None but the most skilful artists are employed in the production of these grounds. A general supply is kept in stock, and in most cases orders can be executed same day as received. All grounds painted on stout canvas, and supplied with turned rollers complete. Alterations of design can be made to any of these grounds, lighting and design reversed, and parts left out or added when desired, or special designs painted at same prices.

Prices.—6×4, 15/-; 7×5, 17/6; 8×7, 21/-; with continuous foreground, 13×7, 31/-; 8×8, 25/-; with continuous foreground, 13×8, 35/-; 10×8, 30/-; state whether to be 10 ft. wide or in length. GROUP BACKGROUNDS: 12×8, 35/-; 14×8 40/-; 16×10, 55/-. Other sizes to order.

Less 5 per cent. discount for cash with order.

THE PHOTO STORES, BLACKBURN.

BACKGROUNDS.—(Continued.)

505.



506.



507.



508.



509.



510.



**STONE
BRIDGE or
SEAT.**

(Reversible)

... Price 35s.



**PEDESTAL
and
BALUSTRADE
ACCESSORY.**

... Price 42s.



*Five per cent. discount for cash
with order.*



No. 436. Watford Recess Seat, 45/-



No. 437. The Beque Pedestal & Balustrade, 50/-



No. 438. Imta Stone Wall, 20/-



No. 440. The North Seat, 35/-

A CHARMING
**STUDIO
ACCESSORY**



Complete Set, Stonework,
Nine Pieces,
Allowing about Thirty changes.



The whole Accessory only

£4 4s.



CHAIR,
12/3

TABLE,
8/6

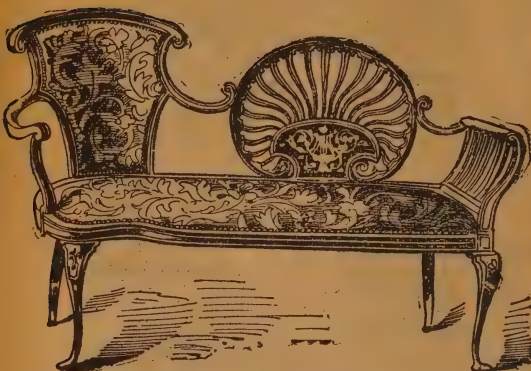
GARDEN SEAT,
21/-

RUSTIC FOOT-STOOL, 3/6.

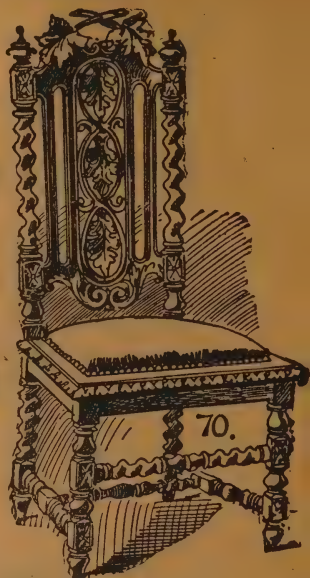
FIVE PER CENT. DISCOUNT FOR CASH WITH ORDER.

THE PHOTO STORES, BLACKBURN.

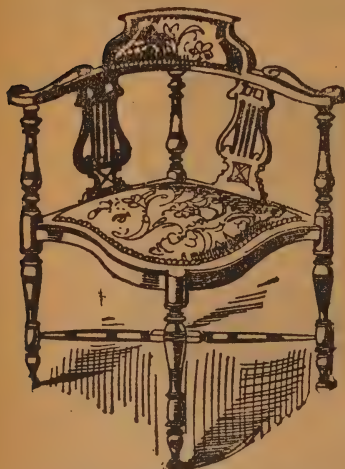
STUDIO FURNITURE.



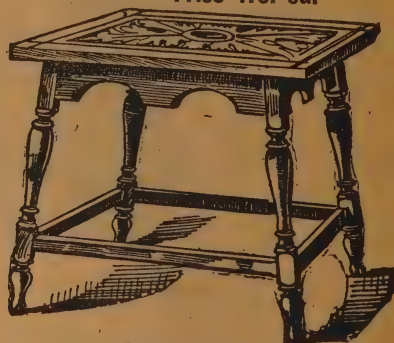
THE "DUCHESS" SETTEE—A lovely accessory. Handsome Inlaid Rosewood Settee, polished, upholstered, and covered with rich silk tapestry.
Price £6.



Antique Carved Oak Chair, with either cane or carved wood seat.
Price 17s. 6d.



A beautiful Inlaid Studio Chair, handsomely inlaid, and upholstered in rich silk.
Price only £2 2s.

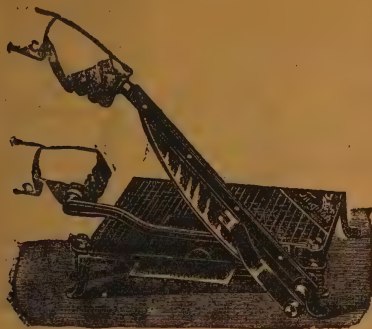


Carved Oak Table.
 A good generally useful accessory.
Price 20s.

Five per cent. discount for cash with order.

THE PHOTO STORES, BLACKBURN.

The —
"RATIONAL"
 Paper & Card Trimmer.



THIS IS
**THE MOST PERFECT TRIMMING-
 BOARD MADE.**

- - WILL LAST A LIFETIME - -



PRICES.

Length of Cutter	3 in.	10 in.	13 in.	21 in.	26 in.	34 in.	39 in.
With Spring Ruler ...	9/6	15/0	20/0	—	—	—	—
With Lever Press ...	—	20/0	30/0	47/6	70/0	92/6	125/0
With Gauge ... extra	—	2/3	6/0	7/9	14/0	16/6	24/0
With Foot Pressure,,	—	—	—	15/0	19/0	23/0	27/0

Five per cent. discount for cash with order.

SMEDLEY'S PHOTO STORES, BLACKBURN, ENGLAND.

The SANDERSON

TIME AND INSTANTANEOUS.

STANDARD PATTERN—To fit on either
the Hood or Tube of the Lens.

BEHIND LENS PATTERN—To fit on to
Camera Front.

BOTH THE SAME PRICE.

NO VIBRATION.

Equal Illumination all
over the Plate.

PERFECTLY RELIABLE.

EASY TO WORK.

Beautifully French Polished.

Speed Indicator Included in
the Price.



Roller Blind Shutter.

With Speed Indicator and Anti-Climatic Ball and Tube.

IT is a fact generally acknowledged by expert Professional and Amateur Photographers alike, that of all types of Shutters the Roller-blind pattern is vastly superior to all others. We feel confident, therefore, in introducing our Shutter made on this principle to Dealers and Amateurs, that we may look for a fair share of their patronage, especially as we are laying ourselves out to supply

A Good Reliable Article at the Lowest Possible Price.

PRICE LIST of the SANDERSON SHUTTERS.

SIZE to fit on Lens Hood or Tube up to Inches diameter:—	1½	1¾	2	2½	3	3½	4	4½	5
Time and Instantaneous. Standard Pattern and Behind Lens. Complete with Speed Indicator. <i>Both the same price</i>	12/6	13/-	14/-	15/-	17/6	21/-	24/-	28/-	30/-
Ditto, STEREOSCOPIC, from ...	18/-	18/-	20/-						
Complete with Speed Indicator.									
Ditto, SELF-CAPPING BLIND ...	25/-	27/6	30/-	32/6					
Complete with Speed Indicator.									

Focal Plane Shutter, "TIME" and RAPID INSTANTANEOUS, in preparation.

Do not overlook the fact that a Speed Indicator is fitted to every Shutter without extra charge. 5 per cent. discount for cash.

The speeds of the smallest size vary from $\frac{1}{10}$ to $\frac{1}{50}$ second, the 2-inch size up to $\frac{1}{15}$ sec., the 2½-inch $\frac{1}{10}$, and so on in proportion to the size of the shutter. PROLONGED TIME Exposure can also be obtained with each shutter.

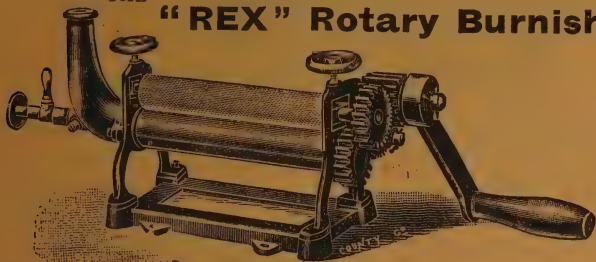
Less Five per cent. discount for cash with order.

ROTARY BURNISHERS

The Cheapest and Best on the Market.

The Illustrations are taken from Photographs, and are approximately correct, but as we are constantly making improvements the Burnishers may be found to vary a little in matters of detail. We reserve the right to alter anything without notice.

THE "REX" Rotary Burnisher.



The "REX" ROTARY BURNISHER is a High-class Machine of the Best Materials and Workmanship.

The Top Roller is solid Steel, Nickel-plated; it is lightly milled so as to get a good grip of the Card.

The Bottom Roller is of cold drawn Steel; it is Nickel-plated and highly polished, and is heated *internally* by our improved Bunsen Burner and Tube, or Spirit Lamp. The face of the Roller is always clean and free from moisture.

The Rollers are adjusted by a Hand Wheel at each end of the machine; our "Improved Adjustment" prevents the Rollers coming in contact with each other, thus preserving their high polish. Our "Improved Bearings" allow the machine to take a thicker card than it is adjusted for, thus avoiding damage to itself or the card.

ALL PARTS ARE INTERCHANGEABLE AND NUMBERED. Duplicates can be supplied without returning the machine.

ALL THE GEARING IS MACHINE-CUT OUT OF THE SOLID, thus ensuring *easy* and *regular* running, and preventing the possibility of transferring the jarring marks on to the print caused by the ordinary Cast Wheels.

BURNISHERS HEATED BY SPIRIT are supplied with Strong Brass Lamp.

EVERY BURNISHER IS TESTED BEFORE LEAVING OUR WORKS, packed in Wood Box, and guaranteed to give satisfaction.

NET PRICES.

WITH GAS BURNER OR SPIRIT LAMP.									
Size: Length of Rollers.		Duplex Gear.			Code Word.	Quadruplex Gear.			Code Word.
Inches.		£	s.	d.		£	s.	d.	
6		1	1	0	ANCHOR BREAK	1	10	0	ANGLE
8		1	18	0		2	8	0	BRASE
10		...	...	...	...	3	0	0	COVER
12		...	...	...	...	3	15	0	DREDGE
16		...	...	...	...	5	0	0	EXHAUST
21		...	...	...	...	8	0	0	FINISH
25		...	...	...	...	11	0	0	GRAIN

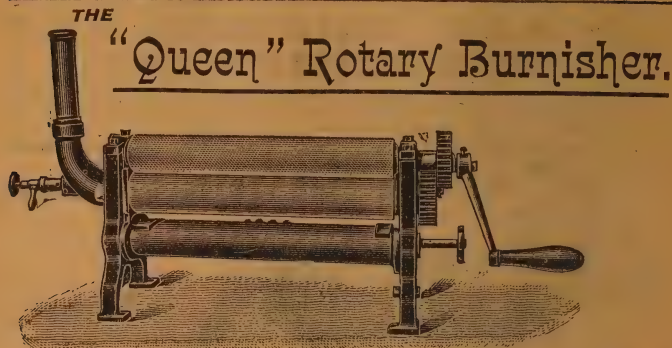
These are High-class Machines at very Moderate Prices.

If the Machines are wanted with Spirit Lamp instead of Gas Burner, add "ing" to the Code Word.

The Machines are always supplied with Gas Burner unless otherwise ordered.

Less five per cent. cash with order.

Cases and packing extra.



The "QUEEN" Rotary Burnisher is a High-class Machine of the Best Material and Workmanship.

It is made with the same precision and care as our "Rex" machine, but is fitted with an arrangement whereby the Roller can be adjusted simultaneously perfectly parallel with each other. This machine is equal to any other machine of a similar class at a much lower price.



FIVE PROMINENT POINTS:—

Simultaneous Adjustment. By a simple arrangement the Rollers are set "DEAD" parallel to each other, a slight turn of **one** wheel gives them any required distance apart.

No complicated system of Wheels, Chains, Screws, Wedges, &c., to get out of order.

Improved Arrangement so that the Rollers cannot come in contact with each other.

Improved Bearings, whereby if a thicker card than the Rollers are adjusted for is put in, the machine will take it without damage to itself or card.

All Parts Interchangeable. Duplicates supplied without returning the machine.

Can be heated with Gas or Spirit in two or three minutes.

Every machine tested before leaving the works and packed in wood box.

Machines heated with Spirit are provided with Strong Brass Lamp. Can be used for Burnishing Scrap Photos.

NET PRICES.

WITH GAS BURNER OR SPIRIT LAMP.									
Size: Length of Rollers.		Duplex Gear.			Code Word.	Quadruplex Gear.			Code Word.
Inches.	£	s.	d.			£	s.	d.	
6½	1	15	0		HAIL	2	5	0	HUNT
8½	2	15	0		INDUCE	3	5	0	INVENT
10½	...	...	...		...	4	7	0	LAMB
12½	...	...	...		...	5	12	0	PUNIP
16	...	...	...		...	7	2	0	WIND

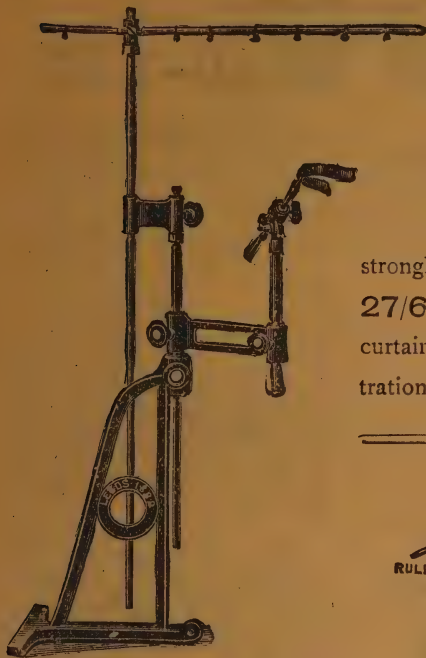
If the Machines are required with Spirit Lamp instead of Gas Burner, add "ing" to the Code Word.

Prices of Larger Sizes on application.

Five per cent. discount for cash with order.

THE PHOTO STORES, BLACKBURN.

HEAD AND BODY RESTS.



WE keep from the cheapest to the most expensive Rests. The one as illustration is a special line we offer being a pattern we can strongly recommend. Price 27/6, or complete with curtain-holder, as in illustration, price 45/-

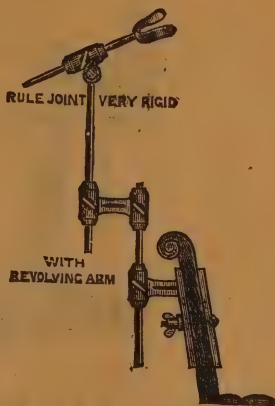
CHAIR-BACK

HEAD-RESTS.

7/3 and 10/-

L. & CO. MANUFACTURERS, LONDON.

Five per cent. discount for cash with order.



THE PHOTO STORES, BLACKBURN.

EMMERSON'S

PATENT STANDARD

CARRIAGE HEAD-REST.



The Emmerson Rest, while combining all the advantages of the Rests that are in the market, is so universal in its movements as to give the operator more facility in meeting the requirements of his clients. It is worked entirely by screws, and these are arranged to give the result required with the slightest touch. It is made in the best malleable iron and brass, and in finish and style of workmanship can be surpassed by none.

On referring to the woodcut it will be seen that inside of the base *BB* are Castors which are worked by a spiral spring *C*, lever *E*, and catch *F*. By pressing the foot on lever *E*, the Rest is raised $\frac{1}{2}$ -inch from the ground and held there by *F*, the Castors are then in a position and the Rest can then be moved to any part of the Studio; by pressing the foot on lever *E*, and releasing *F*, in an upward direction, the Rest is again lowered and stands firmly on base *BB*.

The cup and clamp joint *G*, carrying the vertical rod, supporting body rest and head prongs is worked by screw *H*, and having a universal joint, the rod can be moved in every direction. Body rest *J*, and head prongs *L*, are also provided with universal joints, and can be moved to meet every requirement of the sitter. In the head prongs an entirely new movement has been introduced; at the end of the rod is wheel *M*, by means of which the prongs can be moved wider or smaller, so as to suit any size head.

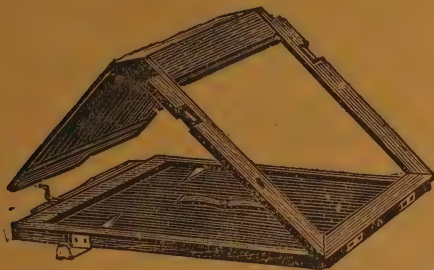
The Emmerson Rest is also made without carriage, but containing all the above improvements, and a commoner Rest to meet the demands of the market.

Prices.	£	s.	d.	£	s.	d.
With carriage ...	4	0	0	3	0	0
Without carriage, but wheel in front ...	2	5	0	1	10	0
Child's best quality	2	0	0	1	8	0

Common Prices.	£	s.	d.	£	s.	d.
With brass fittings and wheel in front ...	1	10	0	1	0	0
With iron fittings ...	1	6	0	0	16	0
Child's best quality	1	4	0	0	14	0

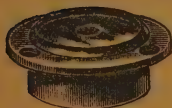
Less Five per cent. cash with order

BOOK-FORM DARK SLIDES.



THESE Slides are of very best quality, made of Mahogany and French-polished, have Folding-over Shutters, as shown in illustration, and are complete with Metal Division, and numbered with Ivory Tablets.

Quarter-plate	...	...	7/6 each.
Half	„	...	10/- „
Whole	„	...	15/- „
10×8	„	...	20/- „
12×10	„	...	25/- „
15×12	„	...	35/- „



SPIRIT LEVELS.

Easily fitted in any Camera.

Without flange, price 6d. each ; with flange, price 9d. each. Larger sizes, 1/6 and 2/- each.

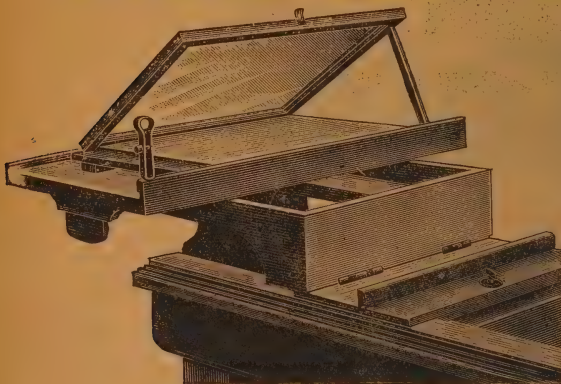
Five per cent. discount for cash with order.

SMEDLEY & CO., Fleming Square, Blackburn, England.

A long-felt want. No one who makes Enlargements should be without it. Any child can make Enlargements when using this Table.

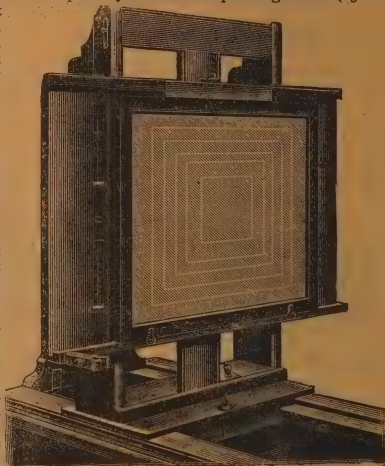
THE NEW ENLARGING AND COPYING TABLE AND SCREEN.

The most compact and efficient photographic accessory ever placed upon the market. Enlarging (by Lantern or Daylight) and Copying, with this Table, are reduced to a simple mechanical process. A brief description of this Apparatus is as follows:—



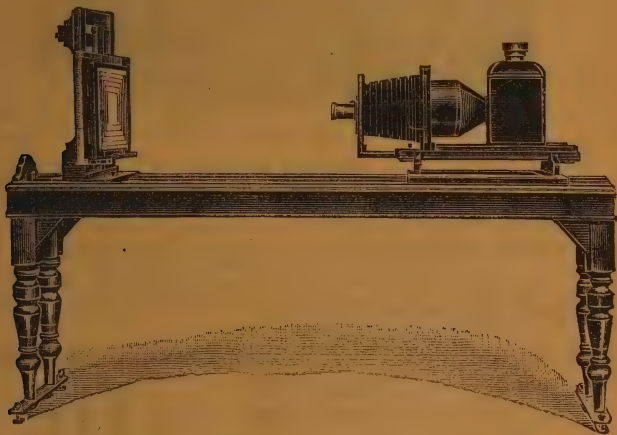
A long table is provided with fold-up legs, which legs are adjustable to unlevel floors, and also run on universal castors. On the top of the table grooves are provided. At one end of these grooves, the carriage for the Lantern is provided. The baseboard of the Lantern sits on this carriage, and by that means can be pushed up to, or away from, the screen (at the opposite end of Table) to give the various degrees of enlargement. The lantern must move in a plane at dead right angle to screen, and cannot get out of the straight.

The Screen is of novel construction, and is the outcome of a long experience of Photographic Enlarging. The screen proper is a specially constructed printing frame (15×12 size, and larger to order). The front is glazed with best plate glass, and opens on hinges like a book. Behind the plate glass front, and in contact with the glass, is a white focussing cardboard screen. The cardboard is ruled off to the usual photographic sizes from 15×12 down to $4\frac{1}{2} \times 3\frac{1}{2}$. The frame is so held in a carrier, that it has horizontal, vertical and circular motions, so that a horizontal or vertical picture can at once be projected on to the ruled focussing cardboard, and a correct idea of how to enlarge the picture may at once be formed, so that the best artistic result may be obtained. It matters not whether the negative picture is not straight, or whether only a part at the extreme edge of plate is to be enlarged. Wherever that part may be, or however out of centre of negative it may be, it can be at once centred dead true and square upon the focussing cardboard, and the ruled lines thereon will be a true guide in setting the frame to the proper position. The actual position of the frame may be as much as 6 or 8 ins.



out of the vertical or horizontal position during exposure, but it will never be out of a true right angle with the centre of negative being enlarged. When the picture has been centred, and composed on the focussing card-board, and truly focussed, the frame can be at once clamped or fixed in a definite position from which it cannot move, but the carrier (in which it slides) is held by a screw attachment at its back, which screw passes through a strong bracket, and the bracket is hinged at its base. By a quick release, this bracket with carrier can be moved back (on its bottom hinges) so that it lies flat on the table end. The front of the frame can then be opened while lying in a horizontal position, and the bromide paper put in flat so that it lies within the ruled lines provided on focussing cardboard. When this has been done, the plate glass front can be closed and clamped, and the bracket with carrier and frame complete may be pushed up to the exact position at which focussing was performed, and the exposure made. For a number of enlargements off one negative, this system is an enormous time saver, as once the focus is obtained, it is only a matter of exposure and changing the paper. No pins are necessary, and the bromide must lie flat, as it is really only in a printing frame with a plate glass front. The end of the printing frame is on hinges, and the glass can be removed and a negative carrier inserted. For Daylight Enlarging, the Lantern is removed from the carriage, and a Camera (the actual one with which the negative is made can be used) placed there instead. By pushing the Table against the darkened out window, and unclamping the screen bracket, and sliding the screen up and down the guides, the degrees of enlargement may be obtained. For Copying Photos, Engravings, Manuscripts, etc., they may be placed in the frame, and the Camera brought up to it. Special frames will be built to order for special purposes, such as holding old books, or large deeds, etc. The uses of such a Table, properly and scientifically built, are very numerous. To Amateurs, Enlarging becomes at once one of the easiest processes with such an apparatus. The whole thing packs up flat, into a parcel about 6 ft. long, 18 ins. wide, 6 ins. deep, and can be put away under a bed or stowed flat against the wall.

It is all British made of best materials.



PRICES:—

Table complete, as in Woodcuts, to enlarge $\frac{1}{4}$ plate to 15×12 ,
£5 5 0.

Screen alone, so made that it clamps to ordinary Table Top
£2 15 0.

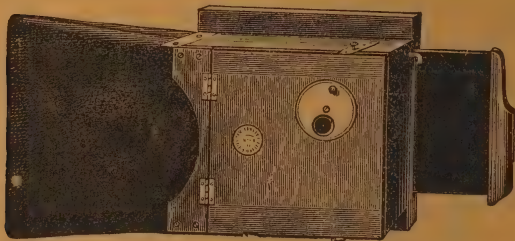
Five per cent. discount for cash with order.

WHY USE DARK SLIDES? WHEN The "PULLMAN" CHANGING BOX

(PATENT)

IS HALF THE PRICE, HALF THE WEIGHT
AND
A DOZEN TIMES THE CONVENIENCE.

The "Pullman" Changing Box never refuses.



No. 1 MODEL.

The advantages are Simplicity, Durability, Cheapness, and absolute perfection in the changing arrangement. There are no Mechanical Appliances or Springs to go wrong, the whole working being so simple as to preclude the possibility of a Plate sticking when the Box is in use, the Plate being held in perfect register during exposure. The Plates are carried in Metal Sheaths, and there is an Indicator to show the number of plates exposed. The $\frac{1}{2}$ -plate Box occupies only half the space of four ordinary double Dark Slides, carries the same number of plates, and is half the weight.

The Box is beautifully finished in Polished Mahogany and lined with Steel, which effectually prevents wear and tear. Films can be substituted for plates by using *card backing in the Sheaths*, or special Film Carriers.

Actual outside size of $\frac{1}{2}$ -plate Box, 8-ins. \times 6 ins.

PRICE, COMPLETE WITH SHEATHS FOR PLATES:—

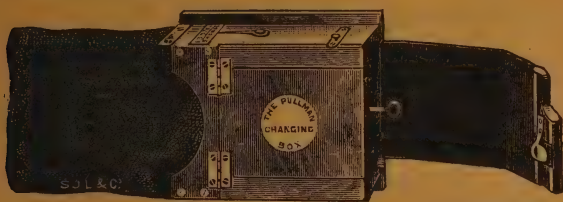
No. 1 MODEL.				Felt Bags.		
				£	s.	d.
$\frac{1}{2}$ -plate to carry 12 Plates or Films	..	..	..	0	18	6
5 \times 4 " 12 "	..	..	..	1	1	6
$\frac{1}{4}$ " 8 "	..	..	..	1	1	6
9 \times 12 c/m " 12 "	..	..	..	1	1	6

Fitting to Customers' own Cameras 2/6, except when special alterations are necessary, when extra will be charged accordingly.

Less Five per cent. discount for cash with order.

THE PHOTO STORES, BLACKBURN.

THE
"PULLMAN" CHANGING BOX
 WITH
Automatic Register and Leather Bag.



No. 2 MODEL. NEW FORM.

The No. 2 Model is finished in better style than the No. 1 and made from selected Spanish Mabogany. The Plate Indicator is at the side and shows clearly the number of the exposures made; also by a lever arrangement inside, it automatically acts as a stop when all the Plates have been exposed, and Locks the Shutter of Box, so that it cannot be opened again until the Plates are changed in the dark room, thus effectually preventing Double Exposures. A Lock and Key is also fitted to the Plate Chamber, and the Bag is made of specially selected Leather.

PRICE, COMPLETE WITH SHEATHS FOR PLATES:—

No. 2 MODEL.				Leather Bags.		
				£	s.	d.
$\frac{1}{4}$ -plate to carry 12 Plates or Films	...			1	7	6
5×4 " 12 "	...			1	13	6
$\frac{1}{2}$ " 8 "	...			1	16	0
9×12 c/m,, 12 "	...			1	16	0

Fitting to Customers' own Cameras 2/6, except when special alterations are necessary, when extra will be charged accordingly.

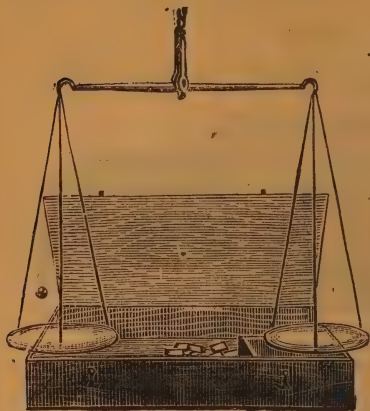
	$\frac{1}{4}$ -plate.	5×4	$\frac{1}{2}$ -plate.
New Leather Bags	4/-	5/6	6/-

When using Films, one glass plate or a sheet of ebonite must be placed at the back of the last sheath to ensure rigidity and to prevent the springs buckling the Films.

Five per cent. discount for cash with order.

THE PHOTO STORES, BLACKBURN.

SCALES & WEIGHTS.



GLASS PANS,

2/6 each.

In oak case complete.

Large size, in
Polished Oak
Box, with Pillar
and Pulley.

Weights from
One Grain to
One Ounce.

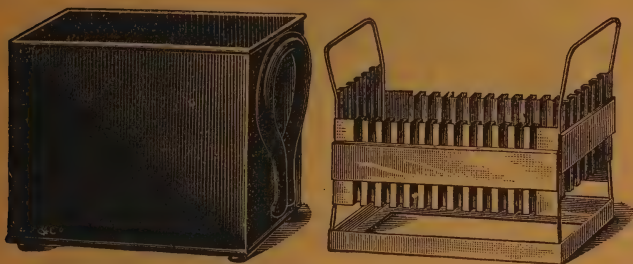
Price 7/-



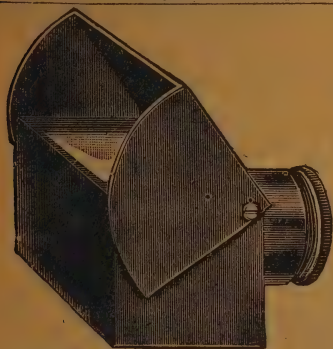
Five per cent. discount for cash with order.

THE PHOTO STORES, BLACKBURN.

Negative Washer and Draining Rack COMBINED.



THIS useful implement carries four sizes of plates, viz.: Lantern size, Quarter-plate, Half-plate, and Whole-plate. Strongly made, and complete with syphon tank, price only 2s. each. Larger sizes supplied to order.



VIEW FINDERS,

Fitted with Sky Shade.

Ground Glass Screen.

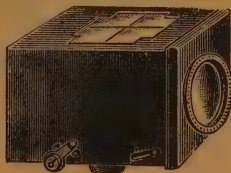
Price 3/6 each.

THE NEW DAZZLE FINDER.

Requires no Shade.
Extremely Brilliant.

Price 4/- each.

Five per cent. discount for cash with order.



SMEDLEY & CO., Fleming Sq., Blackburn, England

"NAMEIT" OUTFIT.

FOR TITLING NEGATIVES.

No more slow and tedious reverse lettering by hand.
Small or large type at same price.

No. 5 Outfit contains 75 letters, spaces, &c., one No. 1 Holder, and roller, complete (post free)

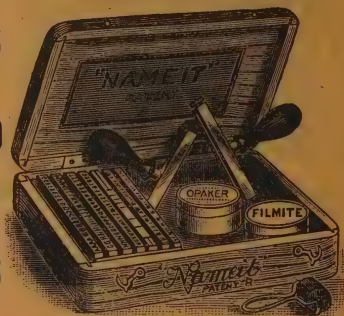
5/6

No. 6 Outfit contains 150 letters, figures, spaces, &c., one No. 1 Holder, and roller, complete (post free) ...

7/10

No. 7 Outfit, with separate compartments for each letter, as illustration, contains 250 letters, figures, spaces, &c., one No. 2 Holder, and roller, complete (post free) ...

12/6



No. 7 Outfit, 12/6.

LISTS AND SPECIMEN PHOTO FREE ON APPLICATION

For the use of Photographers, Amateur or Professional, we can supply Rubber 'Nameit' Stamps of Names, Special Signatures, Trade Marks, Private Marks, Monograms, or other imprints. Prices on receipt of requirements.

Rubber Stamps, Seals, Stencils, Type, &c., of every description supplied.



GRANITINE DISHES.

Special quality. Made of superior quality Porcelain, heavily enamelled.

5 x 4	...	6d.	12 x 10	...	2/3	18 x 15	...	9/6
7 x 5	...	1/-	13 x 11	...	3/-	20 x 16	...	18/6
9 x 7	...	1/6	15 x 12	...	5/3	24 x 20	...	27/6
10 x 8	...	1/10	16 x 13	...	6/6	each.		

Five per cent. discount for cash with order.

SMEDLEY & CO., Fleming St., Blackburn, England.

The Improved RATIONAL PLATE WASHER.



REGISTERED 261,705.

IN submitting our **Improved Registered Rational Plate Washer**, we beg to call your attention to the fact that we have introduced these at about half the price of our previous one, so as to meet the wants both of the profession and also the amateur photographer.

The Washer is made on exactly the same principle as our first one, viz.—the water being delivered from the conduit at the top directly between the plates, so that each plate is thoroughly washed with a separate stream of water. It also has the advantage of the syphon with air vent at the top, which enables the operator to turn off at any time the supply of water and leave the plate still covered, and the syphon will only act when the water reaches up to the air vent, and is thus automatic. When the plates are completely washed the cork may be removed, and the plates drained for drying.

You will note that we have reduced the number of slides from 18 to 9, this number being considered sufficient for ordinary purposes, as if more are required to be washed the first plate is complete washed by the time the tenth one is ready to put in. We beg to inform you that we are also making this Washer for Fixing and Alum Bath without the Conduit, Syphon, and Cork Hole, and shall be pleased to send you samples on application.

PRICE LIST.

	Lantern.	$\frac{1}{2}$ -plate.	$\frac{1}{2}$ -plate.	$\frac{1}{2}$ -plate.
Washers, as shown above	3/-	3/9	4/9	6/6
For Hypo or Fixing Bath, without Conduit and Syphon	2/3	3/-	4/-	5/6

Less Five per cent. discount cash with order.

SMEDLEY & CO., Fleming Square, Blackburn, England.

TURNTABLES.



EASILY fitted to any Camera. Fitted with Clamping Screw and Pegs for receiving legs of stand.

$\frac{1}{4}$ or $\frac{1}{2}$ -plate size **3/6** each.

Larger size for sizes up to 10×8 ... **6/6** „

Extra large, 10 in., and very strong, suitable for Cameras 12×10 and upwards **12/6** „

SUPPLIED WITHOUT PEGS IF DESIRED.

PLATE GLASS CUTTING SHAPES.

C.D.V. ...	6d.	$6 \times 4\frac{1}{4}$...	9d.	10×8 ...	2/-
$\frac{1}{4}$ -plate ...	6d.	$\frac{1}{2}$ -plate ...	1/-	12×10 ...	2/6
5×4 ...	7d.	$\frac{1}{1}$ -plate ...	1/6	15×12 ...	3/-

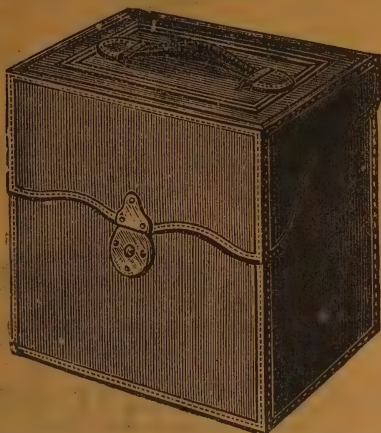
LARGER SIZES TO ORDER.

Five per cent. discount for cash with order.

SMEDLEY & CO., Fleming Sq., Blackburn. England.

CAMERA CASES.

Solid Leather, Cowhide, Black or Brown, with lock and key and Shoulder Strap.



$\frac{1}{4}$ -plate ... 15/6

$\frac{1}{2}$ -plate ... 18/6

Whole-plate, 24/-

10×8 ... 31/-

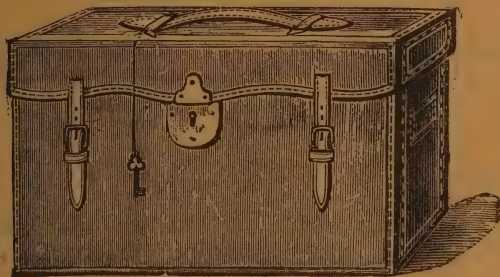
12×10 ... 35/-

15×12 ... 50/-

ACCOMMODATES CAMERA, THREE SLIDES, LENSES, &c
Can be had either oblong or square, up to whole-plate size.

CAMERA CASES.

Stiffened Waterproof, Lined Balze, divided for Slides, lock and key, &c., either square or oblong.



$\frac{1}{4}$ -plate, 8/6 ... Whole-plate, 12/6 ... 10×8, 17/6 ... 12×10, 21/- ... 15×12, 26/-

Five per cent. discount for cash with order.

THE PHOTO STORES, BLACKBURN.



**IMPORTANT to all
PHOTOGRAPHERS.**

New this Season.

**COMPLETE
ONLY**

1s. 3d.

**THE
Anti-
Climatic**

Pneumatic Shutter Release

INTRODUCED by a well-known firm, whose Principal has been for many years connected with the Wholesale and Manufacturing Photographic trade, and who is therefore intimately acquainted with the requirements of Photographers.

It is made of a Special Quality Red Rubber, which has for many years been in use for various purposes in **some of the most trying climates of the world.**

Much dissatisfaction has for a long time existed with regard to the rubber of which balls and tubes have hitherto been made. Coated Rubber, Rubber Mixture, Rubberine, and similar preparations have all proved unsatisfactory, hence it is with considerable satisfaction we announce that, after prolonged and very costly experiments, not only has a satisfactory article resulted, but one that, notwithstanding the many advances in the price of Rubber in late years, is less costly than other similar productions.

PRICE LIST.

Complete Release, consisting of No. 0 Ball, 2 feet Tubing and Teat joined together by means of a Special Screw Connection, 1s. 3d.

(The Ball may be unscrewed at will, and screwed up again, when an air-tight joint is secured.)

No. 0	Ball only, suitable for working 5 feet of Tubing	...	7d. each.
No. 1	" " " " " 10 " " " "	...	10d. "
No. 2	" " " " " 20 " " " "	...	1s. 2d. "
No. 3	" " " " " 30 " " " "	...	1s. 6d. "

Larger Balls can also be supplied.

Extra Teats, **2d.** each. Tubing, **3d.** per foot. Screw Connections, **3d.** per yard. Plain Metal Tube, for fastening Tubing to Teat, **1d.** each. Suitable Wire, **1d.** per yard. The Large Balls with long Tubes are suitable for releasing the shutter when the operator is some distance from the Camera, as well as for self-portraiture and with groups, also for studio use. Any length of Tubing can be supplied.

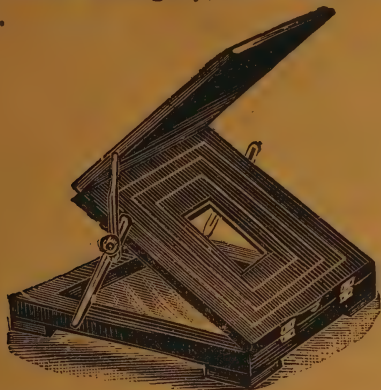
The Anti-Climatic Pneumatic Shutter Release may be used with all Roller-Blind Shutters, Iris Shutters on Kodak and other Hand Cameras, and for other kinds of shutters. Sometimes the Teat is not required; when this is the case it can be readily slipped off the tubing.

Less Five per cent. discount for cash with order.

THE PHOTO STORES, BLACKBURN.

RETOUCHING DESKS.

Made in Best Mahogany, and fitted with Mirror, Carriers, &c.



PRICE.

Whole-plate (and under) ...	...	...	...	10/6
10 × 8 ...	...	...	...	15/-
12 × 10 ...	...	...	...	21/-
15 × 12 ...	...	...	...	30/-

The 12 × 10 and 15 × 12 sizes are fitted with drawer.

We make another $\frac{1}{4}$ -plate Retouching Desk in above pattern with opal reflector, and in pine instead of mahogany, for 7/-



GRASS MATS.

These are made of yellow fibre, are everlasting wear, and do not gather dust. They are specially prepared for Photographic purposes.

PRICE (best quality only).

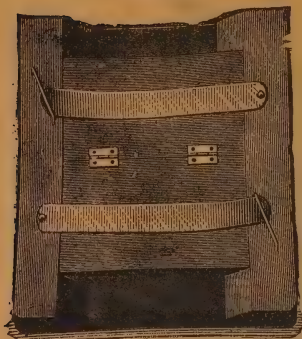
6 by 4 feet ...	...	...	...	10/6
8 by 6 „ ...	...	...	...	21/-
10 by 8 „ ...	...	...	...	30/-

Five per cent. discount for cash with order.

THE PHOTO STORES, BLACKBURN.

Printing Frames.

GOOD QUALITY.



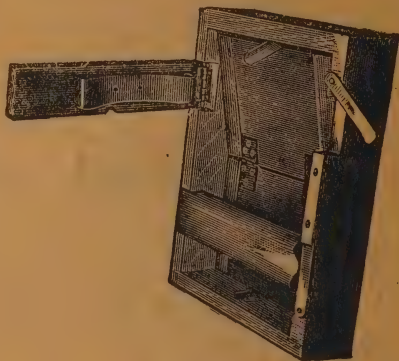
Quarter-plate...	4/9	per doz.
Half-plate ...	8/6	„
Whole-plate ...	10/6	„
10 x 8... ..	1/4	each.
12 x 10 ...	2/0	„
15 x 12 ...	2/9	„

Box Printing Frames,

WITH PLATE GLASS AND RUBBER BACKING.

In Ash or Mahogany,

12 x 10 Size	5/0	each.
15 x 12 „	8/6	„
18 x 16 „	15/0	„
20 x 16 „	20/0	„
24 x 20 „	25/0	„
24 x 24 „	40/0	„



Five per cent. discount for cash with order.

THE PHOTO STORES, BLACKBURN.

DARK ROOM LAMPS.

(PROFESSIONAL.)



FITTED with powerful lamp, light is regulated by lever outside, thoroughly well made and fitted in all parts. Supplied in two patterns ; triangular or square.

Price 6s. 6d. each.

Five per cent. discount for cash with order.

THE PHOTO STORES, BLACKBURN.



COLOUR PERFECTS BEAUTY

of form. Ordinary Photography gives only the shadow of the form of
the beautiful, but pictures in the true colours of Nature are
made by the

L. N. A. SYSTEM OF - -

PHOTOGRAPHY IN COLOURS

BY ALL WHO CAN USE A CAMERA.

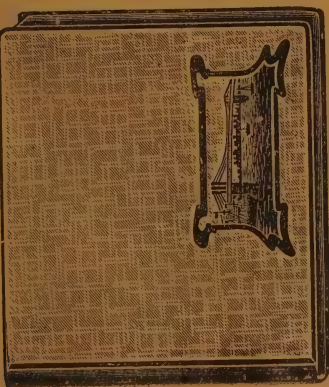
A scientific, simple, certain, easy process. No artistic required. The process
is purely photographic. No costly apparatus; only your own Camera
and our Outfit. Details Free.

COMPLETE OUTFIT, 25s. Of all Photographic Dealers.

Five per cent. discount for cash with order.

THE PHOTO STORES, BLACKBURN

Albums Simplified.



"BALMORAL" I.

THE . . .
"BALMORAL."

A New and Beautiful Series,
in Two Styles of Binding.

Neat.



Artistic.



Durable.



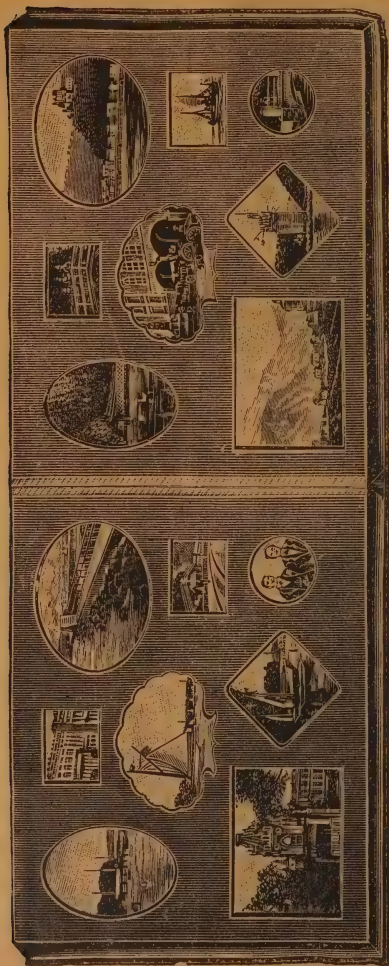
"BALMORAL" II.

Nicely Bound in Art Material, Linen=Jointed Leaves of Art Tints.

PRICE EACH IN CARDBOARD BOX:

	C.D.V.	$\frac{1}{4}$	$\frac{5}{8}$	CAB.	$\frac{1}{4}$
ONE OPENING ON A PAGE (.4 PRINTS)	1/10	2/-	2 3	2/8	3/-
TWO OPENINGS ON A PAGE (.48 PRINTS)	2/8	3/-	3/9	4/3	5/-
FOUR OPENINGS ON A PAGE (.96 PRINTS)	3/9	5/-	6/-	7/6	9/-

Less Five per Cent. discount for Cash with Order.



The "ACADEMY."

THIS is an Ideal Form of Album for 1-Plate and smaller Prints, meeting the requirements of all Amateurs. The small Oval and Circular Openings adapt themselves to fancy details, and when tastefully filled each page forms a most Artistic appearance. A sheet of Perforated Gummed Paper is supplied with each for the purpose of securing the Prints in position.

The leaves are Assorted Art Shades, having a matt surface, the whole being bound in a handsome cover of Art Material.

ALBUM WITH 24 LEAVES, CONTAINING 180 OPENINGS, OUTSIDE SIZE, 13×10 in., Price 5/-

ALBUM WITH 12 LEAVES, 120 OPENINGS, OUTSIDE SIZE, $8\frac{1}{2} \times 6\frac{1}{2}$ in., Price 2/6.

Less five per cent. discount for cash with order.

SMEDLEY & CO., Fleming Sq., Blackburn, England.

Mounts. Mounts. Mounts.

THE CHEAPEST AND BEST MARKET.

Plate sunk Mounts with Paste-on Tint. Good Stout Boards; guaranteed not to cockle.

All Orders despatched day of receipt. Designs: Cream on Light Grey, Cream on White. Plain or Granulated Border.

Size of Tint.	Size of Board.	Price per 100.	Price per 1000.
$4\frac{1}{4} \times 3\frac{1}{4}$...	7×5 ...	£0 3 0 ...	£1 5 0
5×4 ...	7×5 ...	0 3 0 ...	1 5 0
$6\frac{1}{2} \times 4\frac{3}{4}$...	10×8 ...	0 4 6 ...	2 0 0
7×5 ...	10×8 ...	0 4 6 ...	2 0 0
9×7 ...	12×10 ...	0 6 6 ...	3 0 0
$10\frac{1}{2} \times 8\frac{1}{2}$...	15×12 ...	0 9 6 ...	4 12 6
12×10 ...	18×14 ...	0 16 0 ...	7 10 0
13×11 ...	20×16 ...	1 1 0 ...	10 0 0
16×13 ...	24×19 ...	1 6 6 ...	12 10 0

5 per cent. discount for cash with order.

A large and most varied Stock of Carte-de-Visite, Cabinet, Fancy Souvenir, Slip-in, Plate-sunk, Oxford Line, and other kinds of Plain and Fancy Mounts always kept in Stock. A complete set of samples, with prices, will be sent on receipt of six stamps. Customers can rely on prompt attention, all Orders being despatched immediately on receipt.

Five per cent. discount for cash with order.

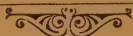
THE PHOTO STORES, BLACKBURN.

LIST OF SECOND-HAND LENSES

Generally kept in Stock, and approximate Prices of same, all made like new before being sent out.



DALLMEYER	1 B Portrait Lens	...	£2 10 0	
"	2 B " " " "	... ..	5 0 0	to £7
"	3 B Patent Portrait Lens		13 0 0	
"	3 D " " "		6 10 0	
"	4 D " " "		8 10 0	
"	5 D " " "		11 10 0	
ROSS	No. 3 Cabinet " "		11 0 0	to £13
"	" 2 " " "		7 0 0	to £9
"	" 3 Portrait 12 in. Focus	...	9 10 0	
"	" 4 " " "	...	14 0 0	
"	" 5 " " "	...	20 0 0	
"	" 3 C. D. V. Portrait 6 in. back Focus	... ..	5 0 0	
"	" 3A C. D. V. 3½ in. diameter, 6 in. back Focus, working F/2. For portraits in dull weather,			£7.



Hundreds of other Lenses, Cameras, and other Apparatus always in Stock Second-hand by most eminent makers.

LESS FIVE PER CENT. DISCOUNT FOR CASH WITH ORDER.

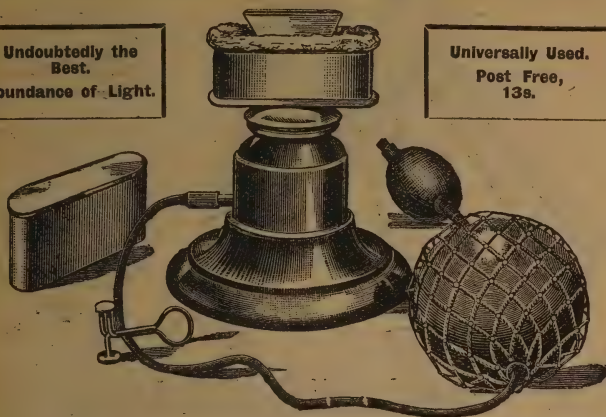
THE PHOTO STORES, BLACKBURN.

[See preceding pages.]

THE TODD-FORRET MAGNESIUM FLASH LAMP.

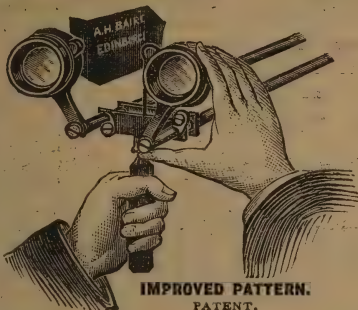
Undoubtedly the
Best.
Abundance of Light.

Universally Used.
Post Free,
13s.



"IT STANDS UNRIVALLED."

The
Carrying Tubes
are now made
detachable,
so that
the instrument
may also
be used for
examining
Stereoscopic
Prints
in Albums,
Stereoscopic
Illustrations



In
Magazines,
Stereoscopic
Window
Transparencies,
&c.

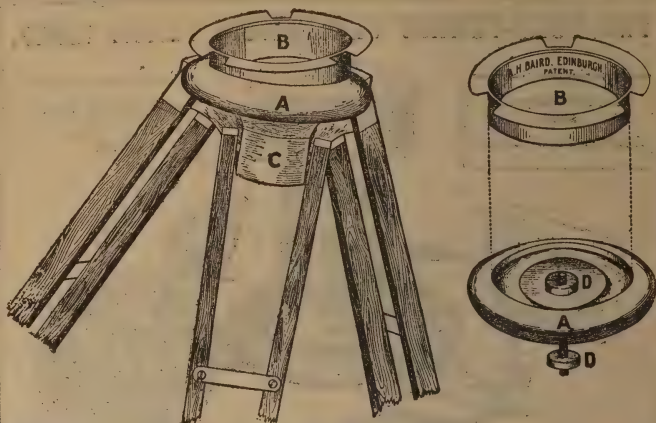
14s.
Post free.

THE FEATURE of the "LOTHIAN" STEREOSCOPE is, the CENTRES
of the LENSES are ADJUSTABLE, and that
SIMULTANEOUSLY.

Price, complete in Box with Instructions, post free, 14s.

ANDREW H. BAIRD, SCIENTIFIC INSTRUMENT MAKER,
39, LOTHIAN STREET, EDINBURGH.

See following pages.



The "Lothian" Quick-Level Top Has solved a Problem.

Post free 4/9.

Particulars on application.

The "LOTHIAN"
Combined Frame is

NEVER IDLE

A. H. BAIRD, Maker,

EDINBURGH.

What
Folks Say:

"Decorative and Useful."
"So Neat." "Variety &
Economy of Purpose."
"One of the Best Novel-
ties." "Ingenious."
"Very Excellent."
"Highly Recommended."
"Well Worth the Money."
"Many Desirable and Ob-
vious Advantages."
"Smartest Departure."
"Solidly Made."
"Nicely Finished."
"Leaves Nothing to be
Wished for."

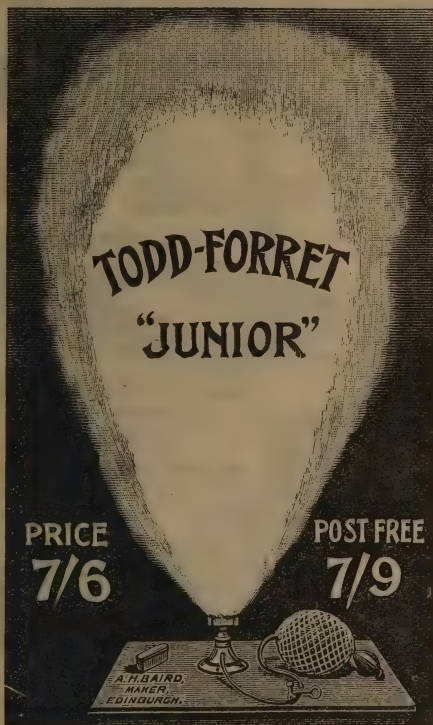
A COMBINED PICTURE, PRINTING, STORING, & TRIAL FRAME.

SIZES: $4\frac{1}{2} \times 3\frac{1}{2}$ 5×4 $6\frac{1}{2} \times 4\frac{1}{2}$ $8\frac{1}{2} \times 6\frac{1}{2}$ 10×8 12×10 15×12
POST FREE: 1/3 1/10 2/1 2/11 4/3 5/4 6/5

ANDREW H. BAIRD, 39, Lothian Street, EDINBURGH.

See following and previous page.

THE "JUNIOR" TODD-FORRET MAGNESIUM FLASH-LAMP



FOR
INSTAN-
TANEOUS
OR
CON-
TINUOUS
EX-
POSURES.

The Todd-Forret Magnesium Flash-Lamp
is used by all the leading Photographers
THROUGHOUT THE WORLD.

See previous pages.

J. H. STEWARD'S OPTICAL LANTERNS

For Oil, Lime, & Electric Light.

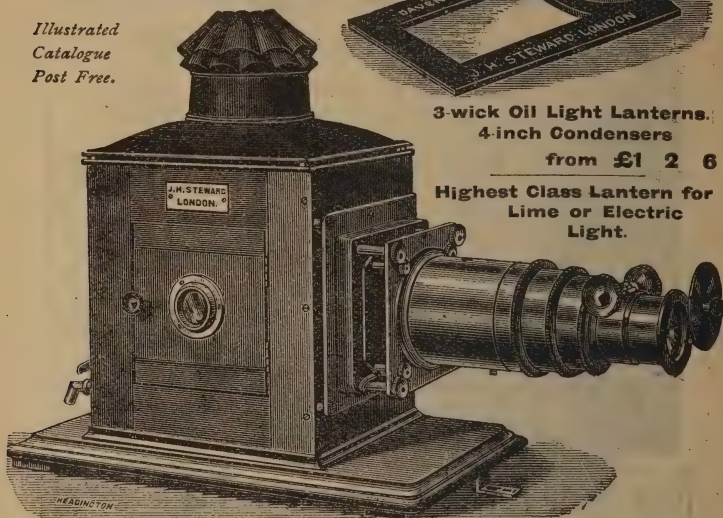
Davenport-Steward
UNIVERSAL
ARC-LAMP,

FOR DIRECT OR
ALTERNATING CURRENTS,

£5 5 0

Acknowledged to be
THE BEST ARC LAMP
for optical projection.

*Illustrated
Catalogue
Post Free.*



Simple.
Steady.
Certain.

3-wick Oil Light Lanterns.
4-inch Condensers
from £1 2 6

**Highest Class Lantern for
Lime or Electric
Light.**

406 & 457 Strand, W.C.; 7, Gracechurch St., E.C., London

Telegraphic Address: "TELEMETER, LONDON."

Telephone; 406 STRAND—GERRARD, 1867; 7 GRACECHURCH STREET—AVENUE 930.

FRAMES

Newest Styles.

Lowest Rates.

For Photographic Enlargements.

Hard Wood Patterns
from $\frac{1}{4}$ in. to 10 in. wide.

SPECIAL OFFER!— $\frac{1}{4}$ plate, 2/-; 12 × 10, 2/6; 15 × 12, 4/6 each, in our celebrated No. 2 frame, SOLID OAK and gilt. Carriage forward. Packing free.

ROGERS & WEBSTER, 161, HIGH HOLBORN, LONDON, W.C.
(near Broad Street, Bloomsbury).

C. A. RUDOWSKY,

22, COLEMAN STREET, LONDON, E.C.

Photo Papers, Mounts, Backgrounds and Accessories,
Cameras, Fernande Burnishers, Iris Vignettters, and all
Photographic Materials.

TELEGRAPHIC ADDRESS—"RUDOWSKY, LONDON."

Nelson's Photographic Gelatine
AND
Nelson's Special X Opaque Gelatine
THE BEST FOR DRY PLATE AND OTHER WORK.

Retail from all Dealers in Photographic Materials. Wholesale from the Manufacturers—

GEORGE NELSON, DALE & CO., Limited,
14, DOWGATE HILL, LONDON, E.C.

F. MESES-GORIS & FILS, TURNHOUT (Belgium).

HIGH-CLASS
BARYTA PAPERS
for
Process in any desired Colour,
GELATINE-CHLORIDE
COLLODION (Brilliant & Matt)
BROMIDE do. do.

Samples on application from
OTTO ROSENSTIEL, 103, Cheapside, LONDON, E.C.
SOLE AGENT FOR THE UNITED KINGDOM—



Tylar's Spring Grip Card Stands.

Affords a simple, easy and effective means of displaying Mounted Photographs or other cards in the window or on the mantelpiece without damaging the original.

Box
of
Twelve,
1/-



Tylar's Porcelain Fixing Trough.

With 6 Celluloid Dippers, makes fixing a pleasure. No getting fingers in the Hypo Solution. Each has 6 Dippers.

$\frac{1}{4}$ pl., 6/6; $\frac{5}{4}$, 7/6; $\frac{1}{2}$ pl., 10/6.

Tylar's P.O.P. Washer.

The only
Reliable
Automatic
Washer for
P.O.P.
Prints.



It keeps P.O.P. on the move, and washes it quickly.

No danger of prints sticking, sinking, or clogging.

Perfectly Automatic in action.

Prints cannot P.O.P. over.

$\frac{1}{4}$ pl. ... 4/6

$\frac{1}{2}$ pl. ... 8/6

$\frac{1}{1}$ pl. ... 12/6

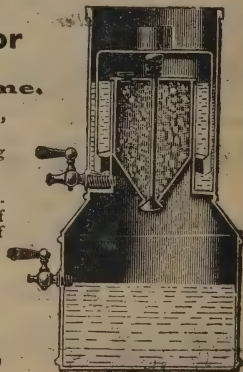
Tylar's Dreadnought Generator

For producing the
Brilliant Acetylene Flame.

It is automatic in its action. It can be left charged, and turned on and off like ordinary household gas.

Everything necessary for use in Optical or Enlarging Lantern, £2 2s.

TYLAR'S UNIQUE CATALOGUE of PHOTOGRAPHIC APPLIANCES contains hundreds of up-to-date useful appliances—produced at a cost of £600. Copies post free 1/- each.



W. TYLAR,

41, High Street, Aston, BIRMINGHAM.

THE **ALDIS LENS**
IS A **PROVED SUCCESS.**

No.	Focal Length.	For Plates	Price in plain iris mounts.
1	5 in.	Inches. $4\frac{1}{2} \times 3\frac{1}{2}$	£ s. d. 1 10 6
2	5 $\frac{1}{2}$ „	5×4	1 13 0
3	7 $\frac{1}{2}$ „	$6\frac{1}{2} \times 4\frac{1}{2}$	2 16 6
4	8 $\frac{1}{2}$ „	7×5	3 17 6

BEST AND CHEAPEST

CATALOGUE

ANASTIGMAT.

FREE.

Aldis Brothers, Oldgrange Rd., Sparkhill, Birmingham.

USE THE . .

PHOTO-AUTOCOPYIST.

A **simplified** form of **COLLOTYPE**, furnishing from Negatives, without elaborate plant, an unlimited number of **splendid PERMANENT PRINTS**, in any colour, on glazed or matt surface papers, equal to Silver, Platinotype, or Bromide Prints. *Great saving of time and expense.* Half-plate Outfit, **£3**. Whole-plate, **£3 10s.**

Also **CIRCULARS, PLANS, SKETCHES, MUSIC, &c.**, in *superior* (Lithographic) style can be obtained on the Photo-Autocopyist by ordering some **"BLACK" AUTOCOPYIST** accessories with it.

Use the **"SELF-COPIER,"** for retaining without trouble a *perfect copy* of every important letter written at home, or while travelling. Complete outfit, **4s. 6d.**

Write for Specimens, &c., or call and see these useful Inventions.

AUTOCOPYIST CO., 64, Queen Victoria St., LONDON, E.C.

The Most Artistic Photographic Printing Process.

SILVER MEDAL, PARIS, 1900.

OZOTYPE

(PATENTED AND REGISTERED).

The New Carbon and Gum Printing
Process,

presenting the following advantages :—

A DISTINCTLY VISIBLE IMAGE,

NO TRANSFER, The picture being rendered in its correct position as to right and left,

NO SAFE EDGE,

NO BLISTERS.

Ready Sensitized Paper in course of preparation,

Read "OZOTYPE," by THOMAS MANLY, price 1s., postage 2d.; also in preparation, "INSTRUCTION IN OZOTYPE," giving the latest information and formulæ, price 3d. post free.

The various materials required for the process, and the above-mentioned Books, can be obtained of the principal Photographic Dealers, or of the

OZOTYPE COMPANY,

1, WEEDINGTON ROAD, KENTISH TOWN, LONDON, N.W.

Send for Price List.

ELLIS'S "PARAGON"

Prepared by
ALFRED ELLIS,
 Photographer.

**RETOUCHING
 MEDIUM.**

Gives an excellent surface for working on either the film or varnish.

This preparation is now used by nearly all the leading Photographers in the world, and gives universal satisfaction. If used on the film it may be varnished with any ordinary negative varnish without the slightest loss of the retouching. Full directions on each bottle.

Can be obtained through any Photographic Dealer, price
 1/- per Bottle, or Post Free 1/2 from

ALFRED ELLIS & WALERY,

Photographers and
 Photographic Dealers, **51, BAKER STREET, LONDON, W.**

**A NEW DEPARTMENT HAS BEEN OPENED FOR
 THE SALE OF PHOTOGRAPHIC MATERIALS AND
 FOR THE DEVELOPMENT OF PLATES AND FILMS.**

**DEAL DIRECT WITH THE PAINTER
 AND SAVE 50 PER CENT.**

12×10 Enlarged and solidly Painted in Oil, 5/-; 15×12, 7/6; 18×14, 8/6; 24×20, 12/6; Water-colours and Black-and-Whites same prices. All likenesses guaranteed perfect or money refunded. Estab. 23 years. Enlargements, post free: 12×10, 1/6; 15×12, 2/-; 18×15, 2/6; 24½×20½, 4/6. Opals in all styles. Colonial Work a Speciality.

F. T. HAYES, Artist, Enlarger, & Photographic Dealer,
10, HAWSTEAD ROAD, CATFORD, LONDON, S.E.

JULIUS HÜLSEN & CO.,
NEWCASTLE-ON-TYNE.

HYPOSULPHITE OF SODA

IN PEA-SIZE CRYSTALS.

Specially prepared for Photo use.

Telegram Address: 'HULSEN, NEWCASTLE-on-TYNE.

• We are Certain •



HAT many Photographers who do not now use the . . .

AEROGRAPH

could do so with profit to themselves, and an improvement in their productions.

If you are one of these, and can come to London when purchasing, we are offering a day's instruction in the use of the instrument free, and we are sure that in that short time we can show you enough to make the

AERO-GRAPH

at once useful in your work.

We are also offering the . . .

AERO-GRAPH

on The Times Monthly Payment plan: this permits of the return of the instrument after a month's trial if you do not find it useful in your work, at the cost to you of the first instalment only.

The AEROGRAPH is useful for Carbons, Bromides, Opals, Platinotypes, &c., either cabinet size or enlargements, for black and white, sepia or water-colours.

Full Particulars on application to—

The Aerograph Co., Ltd.,

**30, Memorial Hall Buildings,
Farringdon Street, London, E.C.**



"No better Enlargement possible."



"An exquisite copy."

WRITE FOR . . .
NEW PRICE LIST.
Mention this
Almanac.

★

ENLARGEMENTS

Lantern Slides!

Developing!

Copying

Finishing!

Retouching!

PRINTING

Silver, P.O.P.,

Bromide and Platinotype.

J. MARTIN & CO.

General Photographic Works, NEW SOUTHGATE, N.

"Finishing superb."

"Will recommend your Printing to all my friends."

C.P.S.' SPECIAL VENTILATED DARK TENT.

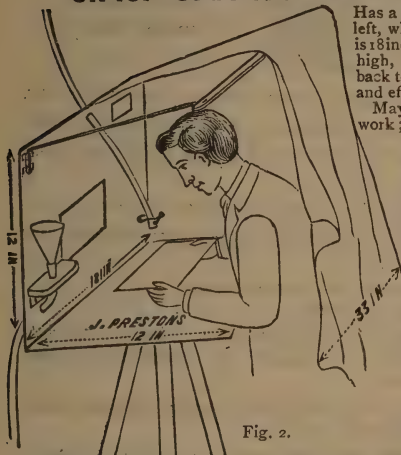


Fig. 2.

Has a working space of 33 inches from right to left, when extended on a table (the rigid part is 18 inches long by 12 inches broad and 12 inches high, the remainder flexible); 48 inches from back to front. The **31/6** or **42/-** has a special and efficient Ventilator (the Sliding Window). May be used on a Tripod Stand for outdoor work; when so required, we attach *Special Blocks for the purpose.* (Vide Woodcut, Fig. 2.)

Price **21/-** Fixed Window; per post, **22/-**; or with Roof Stays, Inlet and Outlet Tubes, Funnel and Stand, **31/6**; per post, **32/6**. Tripod Stand **15/-** extra as Fig. 2. Larger size, **24 X 18**, **31/6**; or with above extras, **42/-**; postage **1/-** extra. Tripod Stand **15/-** extra.

R. A. B. says:—"I have found your Dark Tent of great use during a yachting cruise."

G. D. P. says:—"It is quite the best kind of tent I have yet seen, and I am very much pleased with it."

CATALOGUES ON APPLICATION.

J. PRESTON,

(Late Cubley & Preston),

Chemist and Photographic Dealer, **56, FARGATE, SHEFFIELD.**

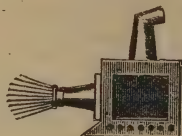
BRIN'S OXYGEN

For LIMELIGHT, MEDICAL, METALLURGICAL,
and other purposes.

**OXYGEN of Guaranteed Purity supplied in Cylinders of the
best British Manufacture, and complying with all the
Established Trade and Railway Regulations.**

THE Public are respectfully informed that all
Cylinders which are filled by the undermentioned Com-
panies (whether their own or their customers') are labelled
with their Trade Mark. This label guarantees the purity of the
Gas, and is a further guarantee that the Cylinder has been tested,
and proved sound in every respect by the Company which has
filled it. Customers are requested to see that the Cylinders
supplied to them bear this label, which is also stamped with the
date on which the Cylinder was filled.

Registered
Trade Mark.



Registered
Trade Mark.

The Works of the Companies are open during business hours
to customers, who are at liberty to inspect the process of manufac-
turing Oxygen, and to witness their own Cylinders being tested
and filled.

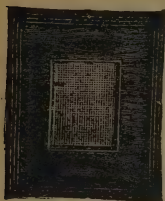
Price Lists of Gases, Cylinders, and all Accessories can be
obtained from the Companies' accredited agents, or will be sent
post free on application.

ADDRESSES:

**BRIN'S OXYGEN COMPANY, Limited, 34, Victoria Street,
WESTMINSTER, S.W. Works: 69, Horseferry Road,
WESTMINSTER, S.W.**

**MANCHESTER OXYGEN COMPANY, Limited, Great Marl-
borough Street, MANCHESTER.**

**BIRMINGHAM OXYGEN COMPANY, Limited, Saltley
Works, BIRMINGHAM.**

SPECIAL REDUCTION.

In $\frac{1}{2}$ -Solid Reeded Oak Frames and Mounts, including Glass and Back boards complete.

10×8 with Cab. Opening ... 4/- doz.
 12×10 „ 8×6 „ ... 6/- „
 14×12 „ 9×7 „ ... 9/- „
 16×14 „ 10×8 „ ... 11/6 „

Special Quotations per Gross. Sample Frame and Mount, 10×8, forwarded by Parcel Post on receipt of 6 penny stamps.

Illustrated Sheet and Price List of Mouldings, Club Frames and Mounts, &c., forwarded free on application. Wholesale and Export.

EPSTEIN & CO., Broad Street, BRISTOL.

Inch Oak and Gilt Slip,

without Mounts.

Any pattern Oak can be had.

12×10 ... at 8/6 doz.

14×11 ... at 10/- „

16×12 ... at 12/6 „

18×14 ... at 14/6 „

20×16 ... at 17/6 „

24×19 ... at 24/6 „

Caramel Sienna Tissue.

The best Anti-Halation Plate Backing.

Easy to apply and detach. With care will last for years.

All who desire to improve their Negatives should give it a trial, when its advantages will be apparent.

In Packets, containing six Sheets.

Post free, $\frac{1}{4}$ -pl. **9d.**, 5×4 **1s.**, $\frac{1}{2}$ -pl. **1s. 6d.**, whole plate **2s.**

J. BROWN, Photo Chemist, Walker-on-Tyne.

For the CHEAPEST and

MOST RELIABLE . . .

Papers & Plates

OF ALL DESCRIPTIONS,

APPLY TO

OTTO SCHÖLZIG,

31, BINFIELD ROAD,

Telegram Address:

CLAPHAM, LONDON,

"OBTESTOR, LONDON."

S.W.

Daylight == == Loading Roll Film TRINITY CAMERAS.

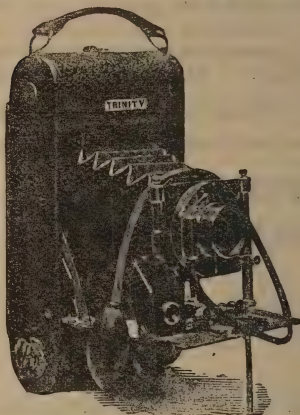
No. 1.

TO TAKE

PICTURES

 $3\frac{1}{2} \times 2\frac{1}{2}$

Handsome finish
Folding Camera,
Achromatic
Single Lens,
Time and
Inst. Shutter,

21/-

No. 2.

$\frac{1}{4}$ -plate, to take
Roll Films

or Plates.

Complete,
as illustrated.
Rising and Cross
Front,
Doublet Lens,
Handsome Finish,
with Focussing
Screen
and Single
Plate Holder,

63/-

WE SEEK NO MONOPOLY, we are quite satis-
fied to trade on the MERIT OF OUR PRODUCTIONS.

The **CURTIS** OPTICAL
& CO.,
PHOTO

Contractors to
His Majesty's Government, 65, Dawson St., Dublin.
(Late of 10, Suffolk Street.)

If you want

**Photographic Goods
Promptly and Cheaply, I can
supply you. I make a speciality
of Mounts.**

Send your orders, or write for quotations to—

JAMES HENDERSON, 164, Union Street,
.. ABERDEEN.



Our door is off the latch
Just step in and see
our stock.

STAMP PHOTOGRAPHS,

AND ALL OTHER SMALL SIZES.

ENLARGEMENTS, &c.

(PERMANENT SEPIA BROMIDES.)

WELLS & CO., SOUTHGATE, N.

LONSDALE BROTHERS,

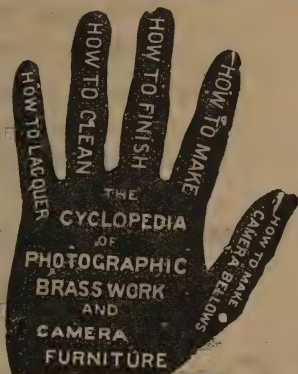
GREEN LANES, HORNSEY, LONDON.



**Camera
Fittings of
every
description.**

27th

Thousand.



**Special
Patterns
made to
Drawings.**

Contractors to
H.M. Government.



POST
FREE
D
4
WITH PRICE LIST OF
FITTINGS, MATERIALS &
WORKSHOP APPLIANCES.
400 ILLUSTRATIONS

STEINBACH & CO.

MANUFACTURERS OF

MALMEDY (RHENISH PRUSSIA.)

Photographic Papers

In well-known superior quality, for all processes, as—

Plain Papers

FOR Solar and Crayon Work.
Platinotype Process.
Bromide Process.

FOR Copying Drawings and Plans for
Ferro-Prussiate, Heliographic, and
Sepia Processes.

Baryta

Paper

FOR Aristo, Collodion, and Bromide Processes.

SOLE AGENTS FOR GREAT BRITAIN & IRELAND—

Messrs. OTTO KÖNIG & CO.

27, Cross Street, Finsbury Pavement, LONDON, E.C.

BERESFORD'S CLIMAX CHANGING TENT

Weight only

3 lb.

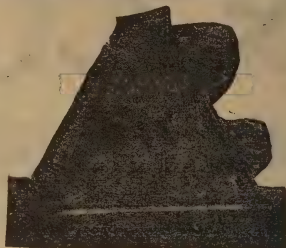
Price 21/-

Measurements:

20 x 20 x 20

Larger Size,

25/-



Invaluable for changing plates of the larger sizes. Folds into small compass.

THE SIMPLEX DEVELOPING TENT, similar to the above, but fitted with sink and waste pipe. Prices, 25/- and 35/-.

BERESFORD'S PARAGON CHANGING BAG



A thoroughly practical and reliable article for changing plates either in dark slides or hand cameras. Has a leather eye-piece fitted with ruby glasses, and a window of ruby medium. Strongly made, very durable, and perfectly safe. Used by all the leading photographers at home and abroad.

PRICES: $\frac{1}{4}$ -plate size, 7/6; $\frac{1}{2}$ -plate, 10/-; $\frac{3}{4}$ -plate, 12/6.

BERESFORD'S PARAGON FOCUSSER

Entirely Supersedes the Focussing Cloth.



This appliance forms a dark chamber between the eyes of the operator and the focussing screen, thereby securing a brilliant image and greatly facilitating fine focussing. Fits on the camera by an elastic band; does not blow about; leaves the hands free. Invaluable for ladies; does not ruffle the hair.

PRICES: — $\frac{1}{4}$ -plate size, 2/6; $\frac{1}{2}$ -plate, 3/-; $\frac{3}{4}$ -plate, 4/-.

Illustrated Price List of Changing Bags, Tents, &c., post free.

F. BERESFORD,

14, BRIDGE ROAD WEST, BATTERSEA, LONDON, S.W.



Absolute . . .
 Perfection . . .
 for
 Retouchers . . .

This famous pencil, made of compressed graphite, manufactured by L. & C. HARDTMUTH, is recognised by experts in retouching work to be the most perfectly adapted pencil made for photographic purposes. It is used in the leading photographic studios, and by amateurs and professionals everywhere.

Perfect Graduation. Takes a Fine Point.
 Delightfully Smooth. Wears Longer than Others.

THEY ARE A PLEASURE TO USE FOR THE FINEST WORK.

OF STATIONERS, ARTISTS' COLOURMEN, PHOTOGRAPHIC
 DEALERS, &C.

L. & C. HARDTMUTH, London, E.C.

THE NEW CENTURY
Royal
Semi-Porcelain
Photographic
Dishes.



THESE Photographic Dishes possess many advantages over other makes. They are of the finest manufacture, light in weight, and conveniently moulded. They are the highest quality ware and the best enameled in the market. All sizes are perfectly flat, need less solution, and so are economical in the use of chemicals. They do not stain so easily as other dishes and are easier to clean.

OF USUAL DEALERS EVERYWHERE.

L. & C. HARDTMUTH, 12, Golden Lane, London, E.C.

Enlarging and Reducing Apparatus.

THE FARRINGTON ENLARGER.



Fig. 98a.

For Daylight or Artificial Light. Bromide Enlargements produced with the greatest ease and certainty. Entails less trouble than making contact prints same size as negative.

This Camera enlarges from Quarter to Whole Plate.

18/- F

THE FARRINGTON REDUCING CAMERA.

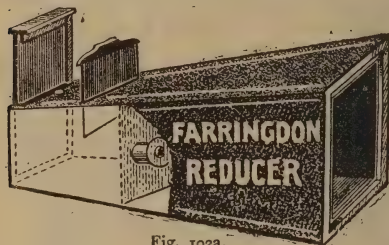


Fig. 102a.

For Daylight or Artificial Light.

This Camera makes Lantern Slides from Half-Plate Negatives.

Each ... 18/- F

Central Wholesale Photo Supply Stores,

Barclay & Sons, Ltd.

95, FARRINGTON STREET, LONDON, E.C.

Price List Free on Application.

ACCESSORIES & BACKGROUNDS.

SEND FOR ILLUSTRATED LIST.

BEST AND CHEAPEST MADE IN THIS COUNTRY.

SKETCHES SUBMITTED & SPECIAL IDEAS WORKED OUT.

EDMOND WALLIS, Photographic Scenic Artist and
Manufacturer of Studio Accessories,

ORPINGTON, KENT.

NUMEROUS PRIZE MEDALS HAVE BEEN AWARDED FOR

OPTICAL-LANTERN SLIDES

Produced by

PHILIP H. FINCHAM,

MYTON ROAD, WEST DULWICH, LONDON, S.E.

**MANUFACTURER AND PUBLISHER
OF MAGIC-LANTERN SLIDES AND READINGS.**

Sample Slide & Catalogue, 1s. 6d.

SLIDES MADE FROM CUSTOMERS' OWN NEGATIVES.

W. BATES & SON

BEG TO INTRODUCE TO YOUR NOTICE

A NEW DEAD BLACK

Possessing Great Qualities of Toughness, Elasticity,
and Solid Covering Power.

THIS BLACK, they feel confident, will prove most useful and convenient
in all Trades where a **BLACK** is required, *and no*

Workshop should be without it.

It DRIES quickly on all surfaces, Wood, Brass, Steel, Leather, &c., &c.

SAMPLE SENT ON RECEIPT OF STAMPS.

6d. Bottles, post free, 9d. **1s. Bottles**, post free, 1s. 4d.

BATES'S PHOTOGRAPHIC BLACK VARNISH

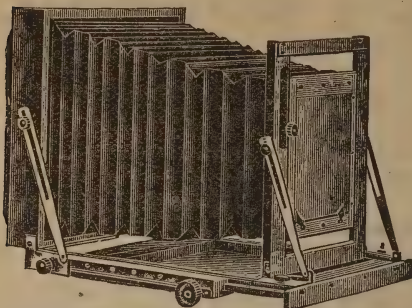
DRIES IMMEDIATELY.

Used by Photographers, Opticians, Manufacturers for the last 45 years; also
largely used in Photo-Engraving and Electrical work; any comment on the
quality of the article is unnecessary. It dries a beautiful Matt Black. Sold
in Bottles, 6d. & 1s.; Half-pints, 2s.; Pints, 3s. 6d.

Agents Wanted. Terms on Application.

PREPARED ONLY BY

W. BATES & SON, East St., Chertsey, SURREY.



ALLEN'S IDEAL FIELD CAMERA.

THIS Camera is a great advance upon the ordinary style of Field Cameras; in addition to having Reversing Back, Double Swing Back, Movable Back (which allows Body of Camera to be pushed forward for wide-angle lens); Interchangeable Panel for Front; Rack and Pinion; Double Extension, Whole plate extending 20 in.; 10 × 12 extending 28 ins. Best Leather Bellows.

It has Double Swing Front, extra high Rising Front, and by a simple arrangement (half turn of two milled-head screws) the front is immediately fixed at any point of the extending base, thus obviating the necessity of constantly moving forward the body when using lens of ordinary focus.

The fact that the front can be fixed at any point of extending base does away with a second pinion, which is necessary with all cameras that can only be fixed at one point.

The fixing of front to base is so arranged that the utmost rigidity is given to all moving parts. The screws are made so that they cannot become detached.

There are no springs to break, or complicated parts to get out of order. Every part is made for hard wear and practical use.

The taper of bellows is very slight, so there is no danger of cutting off the picture.

Made of well-seasoned Mahogany. The base and wearing parts are best Spanish.

Good material and best workmanship throughout.

As a first-class article, this Camera is giving great satisfaction among Professionals. Three days' approval allowed with all Cameras.

Dark slides are fitted with automatic catches and ivory numbers.

Half-plate	...	...	£2 15 0	|	10 × 8	...	...	£4 15 0
Whole-plate	...	...	3 15 0	|	10 × 12	...	...	5 15 0
		12 × 15	...	...	...	...	...	£7 10 0

Extra Dark Slides.

Half-plate, 7/-; Whole-plate, 12/-; 10 × 8, 14/-; 10 × 12, 18/-; 12 × 15, 25/-

SPANISH MAHOGANY DARK SLIDES

MY SPECIAL LINE.

Best quality, book form or solid, for Studio

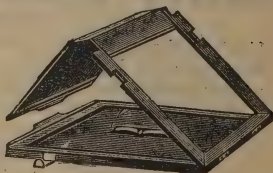
and Field, made to fit any camera.

Satisfaction guaranteed.

Half-plate, 6/6; Whole-plate, 10/6; 10 × 8, 13/-;
10 × 12, 15/6

Alterations and Repairs.

Send for List of CAMERAS, FITTINGS, &c.



W. ALLEN, Camera Manufacturer, Maidenhead.

Cadett & Neall's
Ltd.

BOOKLET OF



holographic Faults and Failures.

Their Cause and Cure.

*With Twenty-four typical Illustrations, and more than
One Hundred valuable practical Hints for
the Tyro and Expert.*


COMPILED AND ARRANGED BY

REV. F. C. LAMBERT, M.A.

Published by CADETT & NEALL, Ltd., Ashtead, Surrey.

PRICE TWOPENCE. Of the Publishers and all Dealers.

THE

Works well with
any Developer.**CADETT**

**GREEN
SENSITIVE**
PLATE**For Landscape Work.**Popular Price : 1/- doz. ($4\frac{1}{4} \times 3\frac{1}{4}$, 8c.)**IMPORTANT NOTICE.** The ordinary dark-room red light is all that is required for development of these plates. Yellow light, such as canary, medium, or orange, must on no account be used.

These plates are for landscape photography, and not for copying paintings. They may be used with advantage in the studio.

New Cheap Series of Landscape Filters.

			1½	1½	2	2½	3½
Square	...	...	2/6	3/-	4/6	7/6	10/6
Circular	...	...	3/6	4/6	7/6	10/6	15/-

BLACKED MAHOGANY FRAMES TO SUIT SQUARE FILTER.

1½	1½	2	2½
1/6		2/-	2/6

N.B.—THE "GILVUS" FILTER CAN ALSO BE USED.

SOLE MANUFACTURERS,

CADETT & NEALL, Ltd, ASHTEAD,
SURREY.

Photographic Paper Manufacturers.

The Practical Photographers'
VADÉ-MECUM

COMPRISING

VIEW METER (Various plates and lenses).

LAMBERT & CADETT'S EXPOSURE METER (without calculations).

EXPOSURE RECORD (detachable, compact).

Reference Tables. Hints. Notes. Formulæ. Weather Signs,
 &c., &c. Pocket Book and Pencil.

Complete, Price **2/6** of all Dealers.

LAMBERT & CADETT'S EXPOSURE METER

May also be had separately, Price **1/-**.

Features.

Same size as a quarter plate, $4\frac{1}{2} \times 3\frac{1}{4}$. Light table for the complete year.
 Moonlight exposures provided for. Pinhole table—without calculations.
 Plate speeds ranging from 3 to 400 H. & D.
 Twenty-five classes of subjects. Landscape, portraiture, glades, &c., &c., with notes.
 Stops ranging from $f/5.6$ to $f/64$.
 Exposures ranging from 1-1000th-sec. to $\frac{1}{2}$ -hour.
 For midsummer light "ordinary landscape" plate speed 100. *No* movements or calculations required.
 For midsummer light and other than "ordinary landscape" subjects, one movement only and no calculations required.
 For all other conditions, one or two movements only and no calculations required.

Price **1/-** of all Dealers.

CADETT & NEALL, Ltd.,
 ASHTEAD, SURREY.

Please write to

CADETT & NEALL, Ltd.,

Ashtead,

Surrey,

for Booklet:

"Orthochromatic and
Three-Colour
Photography"

(SIMPLIFIED),

By JAMES CADETT and SANGER SHEPHERD.

Also PRICE LISTS of

Plates

in every variety, for all purposes.

ALSO

Papers

Printing-out and Bromide, &c., &c.

POST FREE, GRATIS.

Telegraphic Address: "BRAMWELL, ST. HELEN'S."

E. BRAMWELL & SON,

Navigation Chemical Works,
ST. HELEN'S, LANCASHIRE.

Hyposulphite of Soda. Sulphite of Soda.
Salts of Tartar. Borax.
Epsom Salts. Glauber Salts. Sulphite of Lime.

Collodion Emulsion

Gives the Finest results for LANTERN SLIDES AND STEREO-SCOPIC TRANSPARENCIES, combined with brilliancy. There is a great variety of tone. Slides made for Lecturers, Amateurs, Colleges, &c., by the above process.

N.B.—NO TRADE WORK TAKEN.

FOR TERMS, &c., ADDRESS

W. BROOKS, Laurel Villa, Wray Park, REIGATE.

THE AMATEUR PHOTOGRAPHER'S INTELLIGENCE SOCIETY,

52, BOND STREET, LONDON, W.,

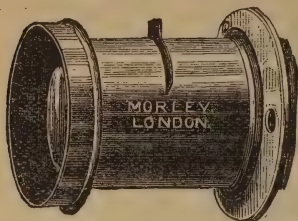
Sells all Photographic Materials at Dealers' prices, and Develops Negatives, Prints, and Enlarges at most moderate rates and with the utmost promptness.

Quality in everything guaranteed, and all orders most carefully attended to.

To its Members it offers the advantages of a Club Room to write letters, see all the Photographic Papers, stock of Cameras, &c., Dark Room, aid and advice from the staff of Esmé Collings, and free entry for the numerous Prizes and Exhibitions that will be offered during the year.

Country Members can join by paying 10s. 6d. per annum, Town Members £1 ls.

THE MANAGER, 52, Bond Street, London, W.

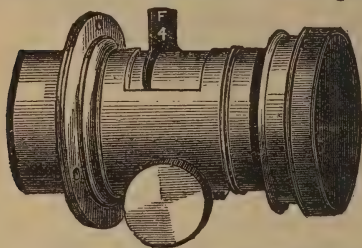
MORLEY & COOPER,**271, UPPER STREET,
LONDON, N.**

Telegraphic Address—

"NEWEST," LONDON.**MORLEY & COOPER'S
RAPID
RECTILINEAR LENSES,**

Adapted for Groups, Portraits, Animals, Landscapes, Figures and all Outdoor Work.

Size of View.	Portrait or Group.	Focus.	No. 1 Quality.		No. 2 Quality.		No. 3 Quality.
			Water-house.	Iris.	Water-house.	Iris.	Iris.
5 × 4	4½ × 3½	5½-inch	£1 15 0	£2 5 0	£1 1 0	£1 5 0	£0 12 0
7½ × 5	6½ × 4½	8 "	2 5 0	3 0 0	1 5 0	1 10 0	0 13 0
8½ × 6½	7½ × 5	11 "	3 10 0	4 5 0	2 0 0	2 10 0	1 0 0
10 × 8	8½ × 6½	13½ "	4 5 0	5 15 0	3 0 0	3 10 0	...
12 × 10	10 × 8	17½ "	5 5 0	6 15 0	4 5 0	5 0 0	...
15 × 12	12 × 10	21 "	6 5 0	8 5 0	5 0 0	6 0 0	...
18 × 16	15 × 12	26 "	9 0 0	11 10 0	...	...	...

MORLEY & COOPER'S FINE QUALITY PORTRAIT LENSES.**C.-D.-V., or ¼-PLATE.**Back Focus 4½ inch, **£1 10s.****CABINET or ½-PLATE.**Back focus 6½ inch, **£2 15s.****¾-CABINET.**Back focus 7½ inch, **£4 10s.****WHOLE-PLATE.**Back focus 9½ inch, **£5 10s.**

NOTE.—The above Prices are subject to 5 per cent. Discount for Cash with Order.

**BACKGROUNDS, STUDIO ACCESSORIES & FITTINGS
A SPECIALITY.**

... Customers' own designs worked out. . .

Enquiries solicited.**Estimates Free.****MORLEY & COOPER, 271, Upper Street, N.,**

{See following page.

MORLEY & COOPER'S NEW AND SECOND-HAND LENSES, CAMERAS & LANTERNS.

By all the Best English and Foreign Makers, including

DALLMEYER'S A, B, C, D Rectilinear and Stigmatic Lenses.

ROSS' Portrait, Cabinet, Symmetrical, and Anastigmatic Lenses.

MORLEY'S Rectilinear, Cabinet, and Long-focus View Lenses.

GOOD INSTRUMENTS PURCHASED OR EXCHANGED.

'THE M.C.' 'THE STAR.' 'THE FAIRY.'

Are acknowledged to be the **Cheapest**, the **Best Made**, and the **Most Reliable** Cameras ever offered to the Public.

The 'M.C.' CAMERA,

With three Double Slides, Half-plate, £3 0 0, Whole-plate, £4 10 0, is the very best value we have ever offered, and is a well-made, reliable Instrument at a very moderate price.

"The STAR."

THREE DOUBLE SLIDES.

Quarter-plate ...	£3 15 0	10×8	£8 0 0
Half-plate	4 10 0	12×10.....	10 10 0
Whole-plate.....	6 0 0	15×12.....	15 15 0

"The FAIRY."

Quarter-plate...	£6 10 0	10×8	£11 10 0
Half-plate	7 10 0	12×10 ..	14 15 0
Whole-plate.....	9 0 0	15×12 ..	18 10 0

All the above have Forward Movements for Wide Angle Lenses.

The above prices are subject to **5 per cent. discount** for cash with order.

MORLEY & COOPER'S 'GEM' HAND CAMERAS.

HIGH-CLASS. ENGLISH MADE.

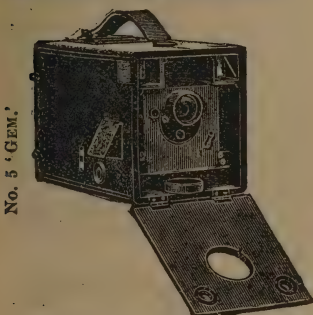
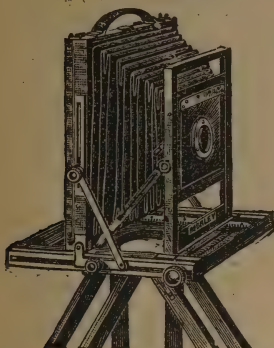
SIMPLE AND RELIABLE.

- | | |
|--|--------|
| No. 2 'GEM.' Carries 12 quarter-plates achromatic single lens ... | 1 10 0 |
| " 3 'GEM.' Superior do. do. ... | 2 5 6 |
| " 5 'GEM.' For 12 quarter-plates, best rapid rectilinear lens and focussing adjustment ... | 4 4 0 |
| " 4 'GEM.' Same as No. 5, but without focussing adjustment ... | 3 6 0 |
| " 6. The 'CYCLIST'S GEM.' Rapid rectilinear lens, and specially adapted for Cyclists ... | 4 10 0 |
| " 7. Twin Lens 'GEM.' ... | 7 7 0 |

Complete List on application. Five per cent. discount for Cash with Order.

ILLUSTRATED CATALOGUES FREE.

[See preceding page





New Registered Porcelain Drainer.

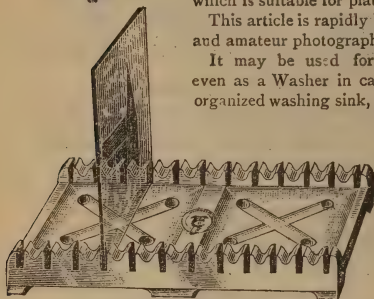
WE beg to call your attention to our New

Registered Porcelain Drainer as above, made in two sizes, viz.:—small, which is suitable for plates up to half-plates, and large, which is suitable for plates up to whole-plates.

This article is rapidly becoming a favourite with both professional and amateur photographers, it being clean and effective.

It may be used for a Drainer, as shown in illustration, or even as a Washer in cases where the operator has not a properly organized washing sink, so as to use a Rational Washer of our make.

This Drainer can be used after the plates are fixed, as a washer, by putting it in the wash-hand bowl, lavatory basin, or other receptacle, and turning the tap into it. The Drainer may, when the washing is effected, be lifted out wholesale with the plates in them, and left to drain quite dry.



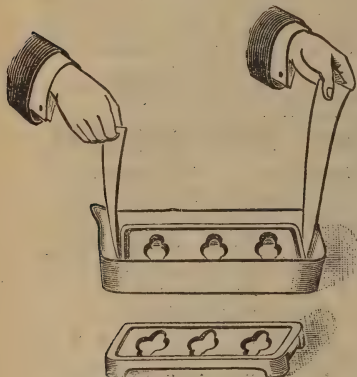
REGISTERED No. 314833.

Porcelain Perforated Weight

*For Developing Films in Lengths for
Kinematograph, Panoram or other
Negatives.*

THE above simple contrivance can be used in any sized Developing Dish, 7 in. and upwards, by preference in one of our Stereoscopic Developing Dishes. The Weight is placed in the Developer with the Film passed under it face downwards, and by drawing it backwards and forwards under the Weight is gradually developed in any length that can be held by the two ends.

Being made of highly-glazed Porcelain the Film can be safely passed underneath the Weight, Film side downwards, without any damage to the face of the Film, and therefore does not need any special apparatus beyond the Developing Weight, which can be used, as stated above, in any sized dish that will take it.



REGISTERED No. 364334.

PRICE LISTS ON APPLICATION

TAYLOR, TUNNICLIFF & CO. (1900), LTD.,
EASTWOOD, HANLEY, Staffs.

London Show Rooms: 23, HOLBORN VIADUCT; E.C. Paris: 76, FAUBOURG ST. DENIS.

See following page,



THE IMPROVED Rational = = = Plate Washer.

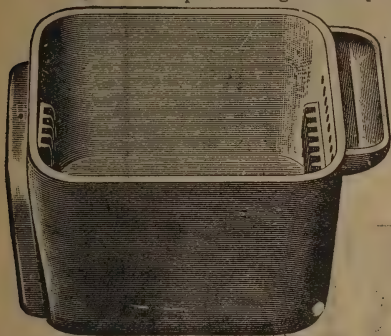
IN submitting the **Improved Registered Plate Washer**, we feel confident we are supplying a want long felt by all classes of Photographers. The principle we have applied of causing the water to enter through the perforations directly between each plate, and syphoning out from the bottom of the Washer, ensures the complete washing of each plate, whether the Washer happens to be

quite, or only partially filled with plates. The air-vent at the top of the Syphon is also a great advantage, enabling the operator at any time to turn off the supply of water, and leave the plates still covered with water, as the Syphon-flow will only act when the water reaches up to the air-vent; thus, by simply turning on the supply of water again, the Syphon is set in action at once.

By removing the Cork, when the washing of the plates is complete, the plates drain themselves ready for drying, and as these Washers are on the market at about half-price of our previous Washer, no doubt an increased demand will ensue.

Made in the following Sizes, viz. :

**Lantern Plate. Half-Plate.
Quarter-Plate. Whole Plate**



REGISTERED No. 261705.

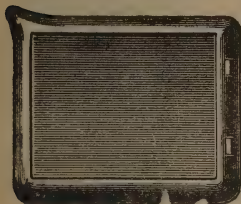
GRANITINE DISHES.

AFTER fifteen years' experience it is acknowledged that these dishes are superior in every respect to the old ones, which were made of common earthenware, without any regard for the purpose for which they were required. The Granite Dishes are made of a special semi-vitreous body and covered with a hard porcelain glaze, and

may be used for all photographic chemicals indiscriminately, supplying a want long felt by professionals and amateurs. The Editor of THE BRITISH JOURNAL OF PHOTOGRAPHY stated, in a letter to the manufacturers, that he had put them to every conceivable test, which they have successfully withstood.

They have recently been improved by the addition of a "RUSH FOOT," as shown, making them more dense in substance than before, and not so liable to adhere to any moisture on developing table.

They may now be had at same price as the common ones, of all respectable dealers, and wholesale only from the manufacturers.



PRICE LISTS ON APPLICATION.

**TAYLOR, TUNNICLIFF & CO. (1900), LTD.,
EASTWOOD, HANLEY, Staffs.**

London Show Rooms : 23, HOLBORN VIADUCT, E.C. Paris : 76, FAUBOURG ST. DENIS.

[See preceding page.]

USE 

WRATTEN'S LONDON PLATES



SOLE MANUFACTURERS,



WRATTEN & WAINWRIGHT,
Croydon.


Telegrams: "Wratten, Croydon."

LISTS FREE.



See also page 1435.

See also tops of Diary, commencing page 584.

 All goods advertised in this Almanac may be obtained direct from Adams & Co.

Adams and Co.,

INVENTORS, PATENTEES, AND
MANUFACTURERS OF

Photographic
Optical and
Scientific
Apparatus.

Telephone No. 5387.
Gerrard.

*
Telegraphic Address:
"Pyro, London."

*
A.B.C. Code,
4th Edition used.

 *Only Address:*

26 Charing Cross Road,

STEAM FACTORIES:

BUNHILL ROW, E.C.

LONDON, W.C.

MESSRS. ADAMS & CO. have had the honour of manufacturing and supplying Apparatus and Materials to His Majesty's Home and Colonial Governments, The Royal Naval and Military Colleges, The Mond Laboratory, The London County Council, The Dock Companies, Science and Art Department, The People's Palace, The Universities, The "Discovery" Antarctic Expedition, and many of the Leading Scientific and Educational Institutions throughout the World.

Prices and minor details of all goods are subject to variation when necessary.

January, 1903.

Adams "YALE."

THE "YALE" IS EVERYBODY'S FAVORITE.

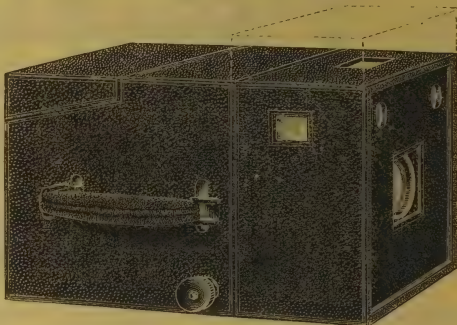
1903 PATTERN,

Now fitted with Rising Fronts and Rack and Pinion focussing.

$\frac{1}{4}$ -pl. size,

£5 5.

Perfect for Cycling.
Nothing to rattle
or get out of order.



Dotted lines shew action of rising front. It rises *both ways*. Shutter setting and release knobs, also speed indicator, are *outside* (left hand of Camera when holding in horizontal position; focussing knob on right).

About $8\frac{3}{4} \times 4\frac{3}{4}$ sq., and weighs about $2\frac{1}{2}$ lbs., complete with sheaths.

THE Yale is still the most popular Camera of all at its price. It takes plates or films. Year by year its sale has grown, until at the present time it holds the proud position of having a far larger sale than all other instruments of its kind put together. It is manufactured throughout at our own factories and sold at a most moderate price. It can be safely forwarded to any part of the world, per return mail, upon receipt of remittance. It is a simple, reliable, and convenient instrument; capable of producing high-class work, with the least possible inconvenience of manipulation.

Lens.—A high-class Rapid Rectilinear working to F 8, fitted with Iris diaphragms.

Rising Fronts. Now supplied both horizontal and vertical.

Shutter.—The new "ADAMS," a metal Shutter of high efficiency, working in *diaphragm slot* at various speeds from $\frac{1}{2}$ to one-hundredth of a second, as well as ordinary time exposures. Such useful speeds as $\frac{1}{8}$, $\frac{1}{4}$, or $\frac{1}{2}$ cannot be accurately obtained with most Shutters, but can with an "ADAMS." Neither is there any trouble with setting speeds, all that is necessary being to place the indicator to speed required. Protector is supplied, so that Shutter can be set without exposing plate. It is fitted with our patent pneumatic regulation, which is wholly of metal. The speeds are marked most carefully, and may be thoroughly relied upon. The speeds marked upon most American and other cheap shutters are most inaccurate and deceptive. Each "ADAMS" Shutter is separately marked and tested.

Finders.—Two brilliant DAZA. The "ADAMS" can be fitted, if desired, at 7/6 extra (see page 363).

Plates.—Takes 12 plates or films, $4\frac{1}{4} \times 3\frac{1}{4}$. (The 12 sheaths supplied take either plates or films. If to take 24 films and 12 plates, the cost will be 8/- extra for the 24 sheaths. If to take 24 films and no plates, only 4/- extra.)

Changing.—The famous Yale infallible system (see page 341).

Focussing.—Focusses from 2 yards to Infinity. Can be fitted to Tripod both ways.

Levels.—A pair of these can be accurately fitted at a cost of 5/6, if required.

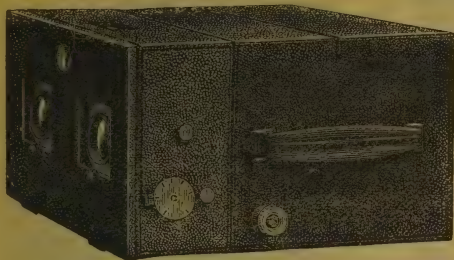
Price, £6 6s. 0d.; or if Cash with order, £5 5s. 0d. net.

Limp Waterproof Case, with Shoulder Strap	-	-	-	$\frac{1}{4}$ -pl.	8/6
Stiff Lined	-	-	-	10/6	12/6
Solid Leather	-	-	-	21/-	23/6
and "Lock and Key"				-	-

When ordering Cases through dealers, see that our name is on them, as we frequently find very common and unsuitable cases are substituted.

Adams "YALE."

STEREOSCOPIC PATTERN.



£12 12 0.

THE BEST
STEREOSCOPIC
CAMERA UPON
THE MARKET.

FOR GENERAL FEATURES, see page 340.

WE are now introducing a stereoscopic pattern of our extremely popular **Yale**. It is a style of instrument particularly adapted for this purpose. There are no useless or complicated movements, yet all necessary adjustments are provided. It measures, as nearly as possible, $8\frac{1}{4} \times 7\frac{1}{4} \times 4\frac{3}{4}$, and weighs, complete with sheaths, only about 4 lbs.

Plates.—Takes 12 plates or films, $6\frac{3}{4} \times 3\frac{1}{4}$. (The 12 sheaths supplied take either plates or films. If to take 24 films and 12 plates, the cost will be 12/- extra for the 24 sheaths. If to take 24 films and no plates, only 6/- extra.) The better pattern, fitted with Zeiss Lenses, is supplied with 3 double dark slides and separate focussing screen.

Shutter.—The new "ADAMS," as described upon page 340, working in the diaphragm slot. Only one blade is used, so both lenses make the exposure simultaneously. Protector is also supplied, thus Shutter can be set without exposing plate.

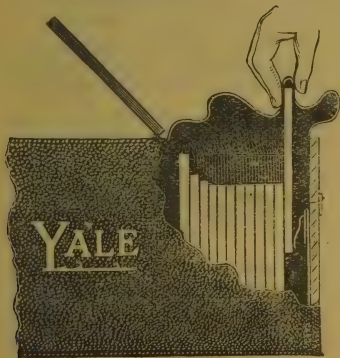
Finder.—The "ADAMS" stationary brilliant. **Rising Front** is provided. **Level** is fitted.

Focussing.—Focusses from two yards to infinity. Can be fitted to tripod.

The new Ross Aplanats are very fine lenses.

With pair of Ross' new Rapid Aplanats, 5 in. F 7.5	- £14 14 0	Or if cash with order, £12 12 0
ZEISS No. 1, Series VIIa, $4\frac{1}{2}$ in. F 6.3	- - 26 10 0	24 0 0
Limp Waterproof Case, with Web Shoulder Strap	- - -	0 9 0
Stiff Lined	- - -	0 13 6
Solid Leather, with Sling and Nickelled Spring Lock and Key	- - -	1 5 6 CC**

Particulars of the "YALE" Changing System.



No system of easily and readily changing plates has been so thoroughly appreciated as the **Yale** system. It is simple and *reliable*, owing to its being absolutely free from mechanism of any kind.

The editor of *The British Journal of Photography*, a well-known expert, says, "It is one of the simplest and most certain I have tried—and I have tried not a few." The reason for its reliability is its perfect simplicity.

Plates or films are simply inserted in their sheaths, and placed in Camera. The front plate stands higher than the rest, and can thus easily be raised and placed at the back of the others. What was the second plate, therefore, now becomes the first, and this stands above the remainder. A light-tight dust-proof bag of soft pliable leather is placed over them to keep all light-tight, and with the fingers the plates are changed as desired from the *outside*.

The plates and films are placed in improved pattern sheaths, which register exactly and accurately in focus irrespective of their thickness, and there is no risk of scratching.

AN ENTIRELY NEW CAMERA FOR 1903.

The very Instrument many have long been asking for.

An ideal Instrument at a remarkably moderate figure.

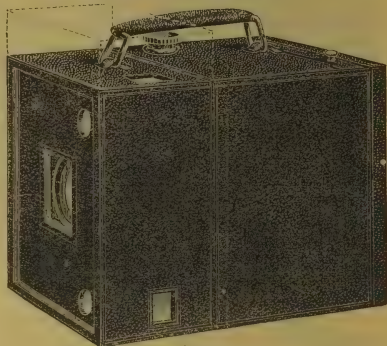
Adams "KĒNĪ."

 $\frac{1}{4}$ -pl.

£10 10s.

 $\frac{5}{4}$ -pl.

£12 12s.



Dotted line shows Rising Front in use. Perfect for Cycling. Nothing to shake or get out of order.

Objects focussed on Screen.
 Detachable Changing Boxes.
 Double Dark Slides.
 Daylight Loading Roll Holder.
 Rising Fronts.
 Rack and Pinion Focussing.
 Adams Brilliant Finders.
 Cooke F 6.5 Lens and the new ADAMS accurately regulated Shutter.

THE "KĒNĪ" is a most important addition to our series of high-class Hand Cameras. The "YALE" has been a most popular and successful camera, but we have frequently been requested to build another upon similar lines, that, instead of being a magazine camera only, should have the great advantage of separate plate and flat film changing magazines, dark slides and daylight loading roll holders, as well as enabling focussing to be done upon a ground glass focussing screen. In the "KĒNĪ" we give the whole of these advantages, thus combining at a most moderate cost the advantages of an extremely simple and reliable Hand Camera, with the necessary movements for using as a Stand Camera.

$\frac{1}{4}$ -pl. with removable focussing screen attached measures $6\frac{1}{2} \times 5\frac{3}{4} \times 4$, and weighs about $2\frac{1}{4}$ lbs.

$\frac{5}{4}$ -pl. with removable focussing screen attached measures $7\frac{1}{4} \times 6\frac{1}{4} \times 4\frac{1}{4}$.

Lens.—5in. COOKE on $\frac{1}{4}$ -pl. and 6 in. on $\frac{5}{4}$ -pl., Iris Diaphragms, working at F. 6.5.

Shutter.—The same as fitted to "YALE" (see page 340). By far the best obtainable.

Finders.—Two ADAMS Patent Brilliant Finders, costing 15/- (see page 363).

Changing.—Either one of the 1903 Patent "ADAMS" Changing Boxes, taking 12 plates or 24 films, or 3 double dark slides, or daylight loading roll holder. All systems may be used without any alteration or addition whatever. Mackenzie-Wishart daylight loading slides can also be fitted.

Focussing.—Either by scale or ground glass screen, which is provided with a good shading hood, by rack and pinion movement. Can be fitted to tripod both ways.

Rising Fronts.—Has good rising fronts for both vertical and horizontal pictures.

Levels.—A pair of these can be accurately fitted at a cost of 5/6, if required.

	PRICE.	Or if cash with order.
$\frac{1}{4}$ -pl. complete with 3 best double dark slides,		
or daylight loading roll holder - - -	£12 0 0	£10 10 0
$\frac{5}{4}$ -pl. do. do. do. - - -	£14 14 0	£12 12 0
$\frac{1}{4}$ -pl. if with new patent Changing Box, special		
finish and covered in real morocco, in-		
stead of either of the above - - -	£13 13 0	£11 12 6
$\frac{5}{4}$ -pl. do. do. do. - - -	£16 10 0	£14 5 0

Extra Slides $\frac{1}{4}$ -pl. 10/- each; $\frac{5}{4}$ -pl. 12/- each. Extra Roll Holders $\frac{1}{4}$ -pl. 30/- each; $\frac{5}{4}$ -pl. 30/- each.

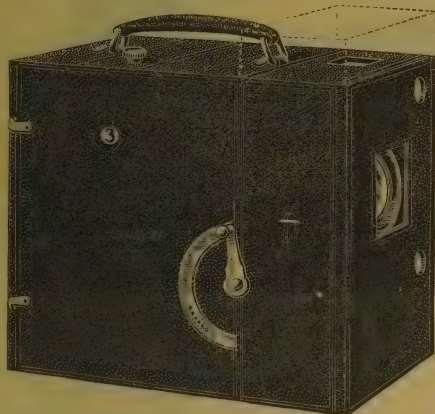
Extra Morocco covered Changing Boxes $\frac{1}{4}$ -pl. 52/6 each; $\frac{5}{4}$ size, 63/-.

Cases, see foot of page 340.

CC**

An entirely new pattern for 1903. The first time this well known and popular changing system has been introduced into a **FIRST-CLASS Hand Camera.** Note the most important new features detailed below.

Adams "LOCKA."



£10 10 0.

$\frac{1}{4}$ -PLATE.

ADAMS BRILLIANT FINDERS and
ADAMS NEW ACCURATELY
REGULATED SHUTTER.
GOERZ 6.3 LENS.
RISING FRONTS.
INSTANTANEOUS CHANGING.
FOCUSING.
12 PLATES OR 24 FILMS.
PLATES LOCKED, thus no rattling,
therefore suitable for cycling, &c.

THIS is a new introduction for 1903, of a first-class camera manufactured at our own factories. As is well known, the falling system of changing has long been before the public, and though in the cheap patterns it has been rather erratic, on account of its simplicity it has been very popular. By an entirely new system of releasing and detaining plates, we have succeeded in achieving something *absolutely* reliable. The exposed plates or films are also held so firmly as to prevent any shaking whatever. Other cameras having a similar changing system have let their plates lay loosely at the bottom, and have shaken and rattled considerably, thus becoming very dusty. In the LOCKA the plates are carefully *locked* down. Another most important feature is, that the camera is provided with both *horizontal and vertical* rising fronts as well as focussing. Has new GOERZ F 6.3 Lens, and is covered in real morocco leather. Altogether a very fine camera.

Lens.—The new GOERZ F 6.3 with iris diaphragms. The finest of anastigmats.

Shutter.—The ADAMS accurately regulated shutter as described upon page 340.

Finders.—Two ADAMS accurate Brilliant. See page 363.

Plates.—Takes 12 plates or cut films, $4\frac{1}{4} \times 3\frac{1}{2}$ size. (The 12 sheaths supplied take either plates or films. If to take 24 films and 12 plates the cost will be 9/- extra for the 24 sheaths. If to take 24 films and no plates, only $\frac{4}{6}$ extra.)

Changing.—Simply pull and push the knob on top.

Focussing.—From 2 yards to infinity by rack and pinion movement. Can be fitted to tripod both ways.

Rising Fronts.—Have good rising fronts for both vertical and horizontal pictures.

Levels.—A pair of these can be accurately fitted at a cost of $\frac{5}{6}$, if required.

$\frac{1}{4}$ -pl., £12 0s. 0d.; or if Cash with order, £10 10s. 0d. net.

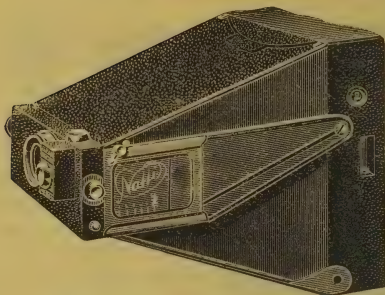
Cases.—See foot of page 340.

CC**

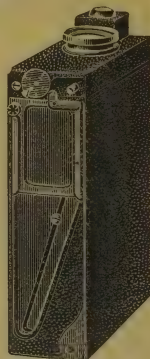
Adams "NATTI."

AN ENTIRELY NEW FOLDING CAMERA FOR THE POCKET.

GREATLY IMPROVED 1903 PATTERN.



Erected for use.



Closed, for inserting in case or pocket.

THE "Natti" is an extremely small and neat folding Camera, easily capable of being carried in the coat pocket. It is *absolutely* self-contained, lens, finder, shutter, level, rising front, camera, and eight plates, all being contained in the dimensions given.

It is one of the simplest to learn and the easiest to use, and is in every respect the beautiful of a Camera for a lady, as well as for cyclists.

No similar Camera will permit of eight plates or twelve films being used in the same instrument, without an elaborate and costly interchanging of parts.

The Lens and Shutter are instantly removable, and can be used upon other Cameras, or for enlarging, etc., at an extra cost of 2/6 for the flange.

It is the only Camera taking plates or flat films that can be opened or closed by a single movement. Pull Lens forward, and Camera is set. Pull it backward, and it is closed.

No other similar Camera can be erected ready for use, or closed for putting away in about one second. There is nothing to remember, therefore nothing to forget.

No other folding pocket Camera is so rigid in use. It is as easy and solid to hold as a block of wood, and is as convenient whether taking horizontal or vertical views.

A plate is always carried in position ready for immediate use.

Plates or Cut Films. It will take 12 flat films or 8 glass plates $4\frac{1}{4} \times 3\frac{1}{4}$, and these may be of the ordinary standard thickness, specially thin ones not being necessary. A noteworthy feature is, that the *same* Camera takes 12 films or 8 plates, therefore no extra expensive changing box is required. The 8 sheaths supplied take either plates or films. If to take 12 films, and 8 plates, the cost will be 4/- extra for the 12 film sheaths.

Size. The dimensions of the whole instrument, complete as above described, is about $6\frac{1}{2}$ ins. long, $3\frac{1}{4}$ ins. wide, and $1\frac{1}{2}$ ins. thick.

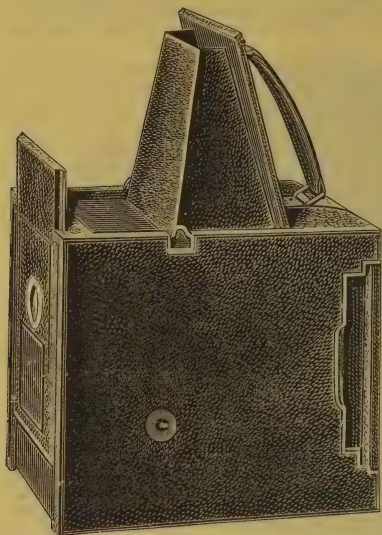
Weight. The weight of the complete apparatus is but about $1\frac{1}{4}$ lbs.

Shutter. The new 1903 pattern "ADAMS" shutter is fitted. No shutter could be more perfect in its extremely smooth working and accuracy of marked speeds. It works in the diaphragm slot, and has a *protector*. When setting the shutter it is *not* necessary to have to remember to separately protect the plates before setting. The shutter speeds are $\frac{1}{2}$, $\frac{1}{4}$, $\frac{1}{8}$, $\frac{1}{16}$, $\frac{1}{32}$, $\frac{1}{64}$ and $\frac{1}{100}$ of a second, also time exposures.

Lens. ZEISS VIIA series, 5 in. focus, working at $f.6.3$, with Iris diaphragm is fitted. We also fit the ROSS Symmetrical Anastigmat working to $f.8$ of similar focus, and the net cost of which is £3 15s. od. This is another very high-class lens, of which the maker's name is sufficient guarantee. Another pattern is supplied with a high-class BAUSCH & LOMB Rapid Rectilinear, working to $f.7.5$. The lens and shutter is instantly removable, so can be readily cleaned, or used upon any other Camera. Other lenses than those listed cannot be fitted.

Adams 'REFLEX'

Animal and Figure Studies, Portraiture, Pictorial, &c., also Sporting Subjects, and high-speed as well as slow-speed work, of every description.



Camera and Focussing hood open and rising front raised.

- Full size view, right way up.
- Objects focussed right up to moment of exposure.
- Pictures taken horizontally or vertically.
- Extensive rising front each way.
- Any lens of suitable focus may be fitted.
- Different lenses may be fitted to same Camera.
- Silent raising of mirror.
- Mirror and Shutter released without vibration.
- Fine long funnel-shaped focussing hood, automatically set.
- Small size and light weight.
- 3 Double Dark Slides carried *inside* Camera.
- New Focal Plane Shutter (A. L. Adams' Patent).
- Speeds 1-1000th to 1-10th, also time exposures. All speeds *marked outside* on top.
- Shutter slit regulated from outside.
- Speeds varied by altering aperture, *not* spring.
- Level fitted. Tripod bush.
- Long extension permitting lenses of long focus.
- Can be carried with plate in position ready for immediate use.
- Takes dark slides, changing box, or daylight loading roll holder, all interchangeable in same Camera.

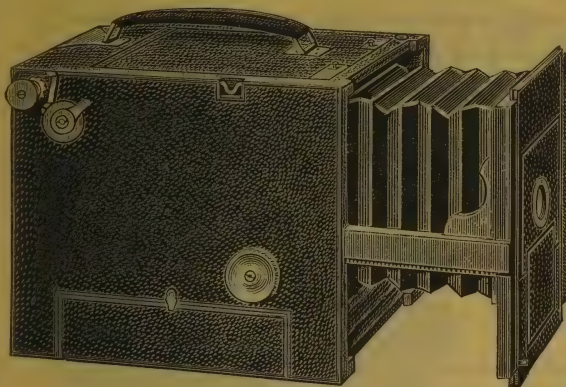
By the use of one lens only, the actual full-sized view is seen and accurately focussed, either horizontally or vertically, right up to the moment of making the exposure.

As the picture can be watched upon the screen, and as the exposure need not be made until the most favourable moment, it is possible to be very certain of results. The advantage of this for animal and figure studies or portraiture, as well as pictorial composition, will at once be apparent. There is no chance or guess work, consequently a feeling of confidence is afforded that tends to most accurate work.

A Reflex Camera shows objects at *all* distances exactly in the same position upon the ground glass as upon the plate.

Is fitted with simple focal plane shutter capable of giving rapid, slow, or time exposures, and permits speed being regulated from outside, each speed also being marked outside. A most useful rising front is provided to the extent of about $1\frac{1}{2}$ inches on both ways of the plate. Any suitable lens may be fitted (see lenses). Different lenses may be fitted to the same Camera, as they are interchangeable in an instant. The raising of the mirror is accomplished in a novel manner by either finger or pneumatic release. It is instantaneous and *silent*. Same movement that releases mirror releases shutter at right moment, thus no time is lost between viewing of object and taking the picture. Everything is self-contained; even the three double dark slides and separate focussing screen for tripod work. Is fully adapted for both hand and stand work, is entirely free from what is popularly called "mechanism," and is extremely simple both in construction and manipulation.

Size.	Outside Measurement.	Approximate Weight (with 3 slides).	Shortest Back Focus.	Longest Focus.
$4\frac{1}{4} \times 3\frac{1}{4}$ in.	- - $8\frac{1}{2} \times 7\frac{3}{8} \times 5\frac{1}{8}$	- - $4\frac{3}{8}$ lbs.	- $5\frac{1}{2}$ in.	- $11\frac{1}{2}$ in.
5×4 in.	- - $9 \times 8\frac{1}{2} \times 6\frac{1}{2}$	- - $5\frac{1}{2}$ lbs.	- $6\frac{1}{2}$ in.	- 14 in.
9×12 cm.	- - $9 \times 8\frac{1}{2} \times 6\frac{1}{2}$	- - $5\frac{1}{2}$ lbs.	9×12 cm., $6\frac{1}{2}$ in.	- 14 in.
$6\frac{1}{2} \times 4\frac{1}{4}$ in.	- - $10\frac{1}{2} \times 10 \times 7\frac{3}{8}$	- - $8\frac{1}{2}$ lbs.	- $7\frac{1}{2}$ in.	- 16 in.



LENS. Almost any lens may be fitted, and it is specially suitable for convertible or combination lenses. Customers' own lenses may be fitted. We do not interfere with or mutilate the lens, therefore it may be used for enlarging or other purposes.

Any lenses between focal lengths given may be fitted. Shortest is the *back* focus, and is the distance required between plate and back part of lens.

FOCAL PLANE SHUTTER (A. L. Adams Patent). This entirely overcomes the two drawbacks to focal plane shutters as previously constructed—namely, the distortion of moving objects, and the difficult methods of altering the slit aperture.

By making the slit travel **slowly** down the plate, such distortion is obtained in the case of moving objects as to become most marked. The ordinary focal plane shutter travels **five times slower** to reach a $\frac{1}{100}$ th of a second. Any distortion with ordinary focal plane shutters is minimised five times by the new Adams system, thus becoming a negligible quantity.

We alter the slit at will from **outside** by merely turning a knob. Every speed is **marked**, and visible from the **outside** of the Camera. When setting shutter it is known at what speed it is working; this has not previously been possible. Speeds provided are from $\frac{1}{1000}$ th to $\frac{1}{10}$ th of a second, also time exposure, and as a focal plane shutter is the most **efficient** it is possible to have, the new Adams Focal Plane Shutter becomes a good all-round shutter. It is provided with finger and pneumatic release, and permits of its slit being adjusted when a plate is in position.

CHANGING SYSTEMS. Camera is designed for dark slides, changing box or daylight loading roll holder. Each system is interchangeable in the same Camera without alteration. Dark slides are, however, strongly recommended. The daylight roll holder is also extremely convenient in manipulation. Each slide takes two plates or two films. The dark slides are very small and light, being only $\frac{3}{16}$ th thick. The shutters draw right out and are made of aluminium. They are most carefully constructed, and **doubly trapped**, thus ensuring them to be absolutely light-tight. Space is arranged **inside** the Camera for carrying three; extra ones may be carried separately.

FOCUSsing SCREEN. Self-contained in the Camera. Two are supplied, one for hand work and one for stand work.

RISEing FRONT. This is available for horizontal or vertical pictures, to the very large extent of about $1\frac{1}{2}$ inches, and the effect is of course seen upon the focussing screen.



FIG. 5.

FOCUSsing HOOD. Hood provided for shielding ground glass screen from light is most effective, it being closed round at its base, and long and funnel shaped. Opening and closing of lid opens and closes hood.

We have now designed an extra hood, enabling the view to be seen in all lights, and when using small stops. It folds quite flat, and can be carried in Camera case or pocket. It **absolutely** shuts out all stray light. The cost is $\frac{7}{6}$ for all sizes, and is strongly recommended (Fig. 5).

TRIPOD WORK. Bush is fitted for use of tripod.

RELEASES. Finger and pneumatic releases are provided, let in **flush** in the side of the Camera.

LEVEL. A level is fitted on top, near the base of the hood.

PRICES. Complete with 3 Double Dark Slides but without Lenses.

Cost of Lenses see below. Customers' own Lenses, if of suitable focal length (see p. 346), can be fitted. For cost of fitting see below.

Size.	Price.	Or if cash with order.
$4\frac{1}{4} \times 3\frac{1}{4}$ in. ..	£18 18s. od.	£16 16s. Od.
5×4 in. or 9×12 cm. £20 os. od.	£20 os. od.	£17 17s. Od.
$6\frac{1}{2} \times 4\frac{1}{4}$ in. ..	£27 os. od.	£24 0s. Od.

CB*

Lenses Specially Suitable for "ADAMS REFLEX."

A net charge of 15/- is made if we have to fit customers' own Lens to special revolving fronts and make detachable interior fitting, and engrave new Iris Diaphragm Scale outside; but Dallmeyer and Zeiss Planar, Unar, or other non-symmetrical Lenses will be 21/-. *If we supply Lens, no charge is made.* O

Any make can be fitted (see page 346 for suitable focus); also Telephoto Lenses.

ADAMS & CO'S "Club" Lens. Guaranteed to pass Kew tests.

$\frac{1}{4}$ -plate— $8\frac{1}{2}$ in. focus. Brass,	£3 7s. 6d.;	Aluminium, £4 18s. Od.	
$\frac{3}{8}$ -plate— $8\frac{1}{2}$ " " " "	£3 7s. 6d.;	" £4 18s. Od.	
$\frac{1}{2}$ -plate—11 " " " "	£4 5s. Od.;	" £5 19s. Od.	CC

ROSS. Universal Symmetric Anastigmats. New extra rapid series, *f* 5.6.

$\frac{1}{4}$ -plate or $\frac{3}{8}$ -plate—No. 4.	$7\frac{1}{2}$ in. Equiv. focus,	£7 10s. Od.	
" " No. 5.	9 " " "	£9 0s. Od.	
$\frac{1}{2}$ -plate—No. 5.	9 " " "	£9 0s. Od.	
" " No. 6.	11 " " "	£12 0s. Od.	CC

ZEISS. "Planar." "Unar." Those of suitable focus, as page 346, may be fitted.**ZEISS. Series VIIa. Convertible Anastigmats.** *f* 6.3.

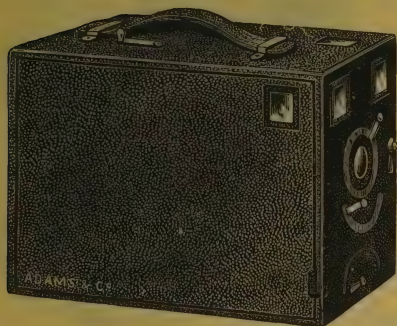
$\frac{1}{4}$ -pl.—No. 7. Single combinations, $11\frac{1}{2}$ in.;	Combined focus, $6\frac{1}{2}$ in.,	£9 15s. Od. net.	
$\frac{3}{8}$ -pl.—No. 10. " " " " " "	14 " ; " " " "	£11 15s. Od. " "	
$\frac{1}{2}$ -pl.—No. 13. " " " " " "	16 $\frac{1}{2}$ " ; " " " "	£15 5s. Od. " "	CB

As both the Single and Combined lenses can be used, these are the lenses we strongly recommend, as they are the best and most suitable in every possible way.

The following are listed as "ADDITIONS," as they are not necessities, and are therefore not added to the first cost of the Cameras.	$\frac{1}{4}$	$\frac{5}{8}$ or $1\frac{1}{2}$ cm.	$\frac{1}{2}$
Small additional Flexible Focussing Hood, see page 348	£ s. d.	£ s. d.	£ s. d.
Extra Dark Slides - - - - - each	0 13 0	0 13 6	0 17 6
$\frac{1}{4}$-Plate Carriers for Dark Slides - - - - - each	..	0 1 0	0 1 6
Reversible Changing Boxes - - - - -	2 17 6	3 5 0	3 17 6
Reversible Daylight Loading Roll Holder - - - - -	1 15 0	1 17 6	2 10 0
Best Solid Leather Cases, with Lock and Key, and Detachable Shoulder Strap - - - - -	1 13 6	1 15 0	2 0 0
Small do., for 3 extra Slides, Box or Roll Holder - - - - -	0 15 6	0 16 6	0 19 6
First quality strong Collapsible Waterproof Case, with Web Shoulder Strap complete - - - - -	0 17 6	0 18 6	1 1 0
Ditto, but with small pocket at end, for three extra Slides, Changing Box, or Roll Holder - - - - -	1 0 0	1 1 0	1 4 0
Adjustable Web Shoulder Strap for Camera (If case is bought this is included.) - - - - -	0 5 6	0 5 6	0 5 6
"Club" Three-fold Tripod Stands - - - - -	1 2 6	1 2 6	1 6 6
Aluminium Binding for Tropical Climates - - - - -	1 1 0	1 1 0	1 10 0
Engraved Focussing Scale, if required - - - - -	0 5 0	0 5 0	0 5 0
Extra Lens Fronts, with Flaps - - - - -	0 8 6	0 8 6	0 10 0
Cost of fitting Customers' Lenses, see above.			
Isochromatic Screens - - - - -	0 7 6	0 7 6	0 10 6
Deep Back Doors for Box or Roll Holder - - - - -	0 10 6	0 12 6	0 17 6
Dallmeyer Telephoto attachment, including fitting to ZEISS Lenses - - - - -	4 0 0	4 15 0	5 10 0

CB*

THE "AUTO."



No. 1, $4\frac{1}{4} \times 3\frac{1}{4}$,

£1 1 0

No. 2, $4\frac{1}{4} \times 3\frac{1}{4}$,

£2 2 0

No. 3, $4\frac{1}{4} \times 3\frac{1}{4}$,

£3 3 0

Bullard, 5×4 ,

£4 4 0

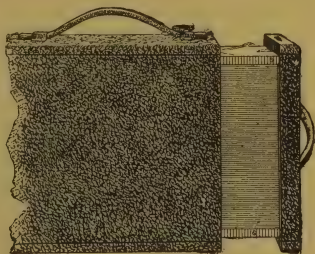
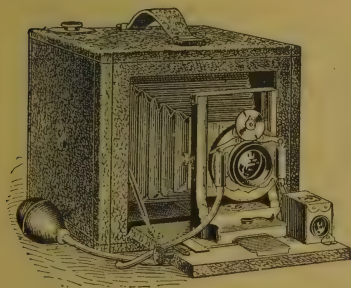
THIS series can be recommended where automatic Cameras are preferred, and are certainly the best of their kind. Those wishing for an instrument cheaper than the **Yale** will find these quite satisfactory.

No. 1 Pattern. A marvel of cheapness and yet a thoroughly workable Camera similar to No. 2 pattern, but of cheaper quality, and is fixed focus. Price, 21/- net.

No. 2 Pattern. Takes 12 plates or films, $4\frac{1}{4} \times 3\frac{1}{4}$, which are automatically changed by simply touching a lever. Has first-class lens, iris diaphragm, two brilliant finders, focussing scale from 10 ft. to infinity, and time and instantaneous shutter working to different speeds, is neatly covered, and well and substantially made. An automatic indicator shews number of plates exposed. Is fitted for tripod use both ways, weighs about $3\frac{1}{4}$ lbs. complete with sheaths, and measures $9\frac{1}{4} \times 4 \times 7$. Price, £2 2s. 0d. net.

No. 3 Pattern. This is similar to No. 2, but has good rapid rectilinear lens working to F 8. Price, £3 3s. 0d. net.

Bullard Pattern. This is 5×4 size, and of very novel construction. It holds 18 plates or films, which are most easily changed by pulling open the back of the Camera and closing it again. It is quite simple and reliable. It is very small, measuring when closed $6 \times 6\frac{1}{2} \times 7\frac{1}{4}$ ins. with the 18 sheaths. Good rapid rectilinear lens working to F 8. Camera well covered in good leather, double valve, time and instantaneous shutter, rising, falling and sliding front, and brilliant finder. Price, £4 4s. 0d. net.

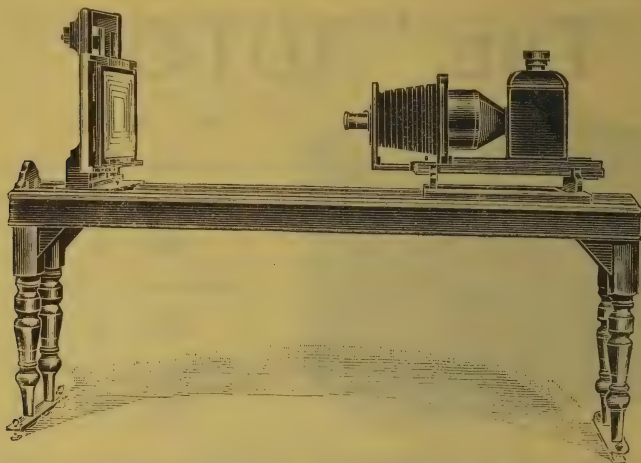


CC**

Bullard Pattern.

A really good and simply manipulated Camera that we can recommend.

EVERY MAKE OF HAND OR FIELD CAMERA SUPPLIED.



Enlarging and Copying Table and Screen.

Table complete (Lantern extra) to enlarge $\frac{1}{4}$ plate to 15×12 , £5 5s.

Screen part only, so made that it clamps to ordinary Table Top, £2 15s.

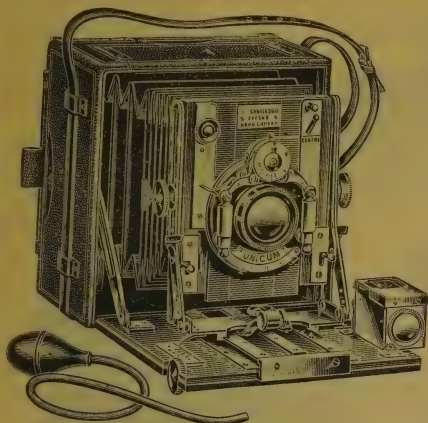
**Ordinary form of Enlarging Easel, with 6 ft. baseboard, complete to take
Plates or Bromide Papers up to 18×16 , 21/- net.**

ENLARGING (by Lantern or Daylight), and Copying, with this table, is reduced to a simple process. A long table is provided with fold up legs, which legs are adjustable to unlevel floors, and also run on universal castors. On the top of table are grooves. At one end of these grooves, the carriage for the Lantern is provided, and baseboard of Lantern sits on this carriage, and can be pushed up to, and away from, the screen (at the opposite end of Table), to give the various degrees of enlargement. Screen is a specially constructed printing frame (15×12 size, and larger to order), glazed with best plate glass, and opens on hinges like a book. Behind plate glass front, and in contact with glass, is a white focussing cardboard screen. The cardboard is ruled off to the usual photographic sizes from 15×12 down to $4\frac{1}{4} \times 3\frac{1}{4}$. The frame is so held in a carrier, that it has horizontal, vertical and circular motions. It does not matter if negative is not straight, or whether only part of plate is to be enlarged. However out of centre negative may be, it can at once be made true and square upon the focussing cardboard, and the ruled lines will be a true guide. When picture has been centred on focussing cardboard and focussed, the frame can be clamped; screw passes through bracket and is hinged at its base. This bracket with carrier can be moved back (on its bottom hinges) so that it lies flat on the table end. The front of the frame can then be opened while lying in a horizontal position, and the bromide paper put in flat so that it lies within the ruled lines provided on focussing cardboard. For a number of enlargements off one negative, this system is speedy, as once focus is obtained, it is only a matter of exposure and changing the paper. No pins are necessary, and the bromide must lie flat, as it is really only in a printing frame with a plate glass front. The end of the printing frame is on hinges, and the glass can be removed, and a negative carrier inserted. For Daylight Enlarging Lantern is removed from carriage, and a Camera (the actual one with which the negative is made, can be used) placed there instead. By pushing the Table against the darkened out window, and unclamping the screen bracket, and sliding the screen up and down the guides, the degrees of enlargement may be obtained. For Copying Photos, Engravings, Manuscripts, etc., they may be placed in the frame, and the Camera brought up to it. Packs up flat, into a parcel about 6 ft. long \times 18 ins. wide \times 6 ins. deep, and can be put away under a bed, or stowed flat against the wall.

Sanderson Camera.

Our prices will be found lower than usual, and when obtained direct from us, we supply an "ADAMS" Brilliant Finder, FREE OF COST. If used as a Hand Camera, this is necessary, as it is the *only* accurate Finder. If a new "ADAMS" Changing Box is fitted, we allow 10/- for the three $\frac{1}{2}$ pl., 14/3 for the three 5×4, and in the "De Luxe" pattern £2 10s. for the three $\frac{1}{2}$ pl. slides, and make *no* charge for fitting.

The "Sanderson" is more useful as a Stand or Field Camera than a Hand Camera. The illustration shows its appearance as used in the Hand. To obtain the advantages of its different adjustments and various swing movements, we recommend a Goerz or Dallmeyer Lens. It will take lenses of long or short focus, also telephoto lenses, and is suitable for copying.



"Regular" Extension. "Tourist" Extension. "De Luxe" Extension.

$4\frac{1}{2} \times 3\frac{1}{2}$	2 to 14 $\frac{1}{2}$ ins.	2 to 12 ins.	$2\frac{1}{2}$ to 15 $\frac{1}{2}$ ins.
5×4	2 " 16 "	2 " 14 "	$2\frac{1}{2}$ " 17 "
$6\frac{1}{2} \times 4\frac{1}{2}$	2 $\frac{1}{2}$ " 21 "	$2\frac{1}{2}$ " 17 "	3 " 22 $\frac{1}{2}$ "
$8\frac{1}{2} \times 6\frac{1}{2}$	3 " 27 "	3 " 20 "	

No. 1. Camera, complete, with "Bausch & Lomb" Lens, F 8, "Unicum" Shutter, "ADAMS" Bright Finder and 3 Double Plate Holders.

No. 3. Ditto, with "Dallmeyer" Stigmatic Lens, Series II., F 6, Ditto.

No. 4. Ditto, with "Goerz" Lens, Series III., F 6.8, Ditto.

No. 6. Camera, complete, with "ADAMS" Bright Finder, three Double Backs, but without Lens or Shutter.

		$4\frac{1}{2} \times 3\frac{1}{2}$ in.	5×4 in.	$6\frac{1}{2} \times 4\frac{1}{2}$ in.	$8\frac{1}{2} \times 6\frac{1}{2}$ in.
AS DESCRIPTION.	No. 1. {				
	Regular model	6 10 8	7 9 8	10 6 8	17 2 0
	Tourist "	6 3 6	7 2 6	9 19 6	16 14 10
	De Luxe "	9 19 6	11 8 0	17 11 6	
	No. 3. {				
	Regular model	11 5 8	13 15 6	18 10 6	
	Tourist "	10 18 6	13 8 4	18 3 4	
	De Luxe "	14 9 9	17 6 9	25 8 3	
	No. 4. {				
	Regular model	10 6 8	12 4 8	16 10 2	25 8 3
	Tourist "	9 19 6	11 17 6	16 3 0	25 1 4
	De Luxe "	13 15 6	16 3 0	23 15 0	
	No. 6. {				
	Regular model	4 12 8	5 11 8	8 9 2	13 15 6
	Tourist "	4 5 6	5 4 6	8 1 6	13 8 4
	De Luxe "	8 1 6	9 10 0	15 13 6	

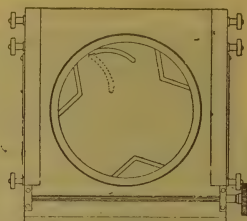
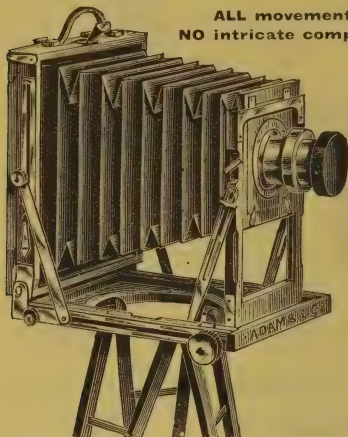
All Goods as Maker's Catalogue.

EXTRAS.

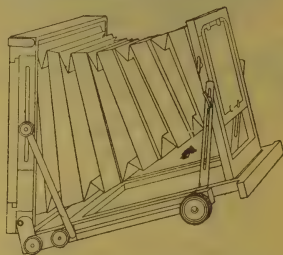
Extra Double Plate Holders	0 3 4	0 4 9		
Extra Mahogany do. -	0 7 1	0 8 1	0 10 0	0 17 7
Extra "Best Quality" do. -	0 12 10	0 14 3	0 16 8	1 3 9
"Adams" Improved Changing Box, see p. 355.	2 12 6	3 3 0	3 17 6	

ADAMS & CO.'S "CLUB" CAMERA.

ALL movements, but
NO intricate complications.



The best Field Camera made. A fine piece of High-class Workmanship.



LIGHT, portable, and compact. Is square, has reversing back, rising and falling front, and swinging motion both back and front. The back part slides up to front, to use wide angle lenses, is long focus, the back sliding in grooves, and the front being moved by rackwork adjustment. Thoroughly strong and rigid, and suitable for all work. Dark-slides fitted with stop springs to shutters. It has a revolving turntable, which can be clamped at any point, and to which the three-fold stand supplied can be affixed in a thoroughly simple manner.

Size in Inches.	Prices, including 3 double backs, a 3-fold tripod and revolving turntable complete.	Extra Double Dark Slides.	Brass Binding.	Size of Camera.	Approximate Weight of Camera.	Extends.	Best Solid Leather Case.
	£ s. d.	£ s. d.	£ s. d.		lbs. ozs.	ins.	£ s. d.
$6\frac{1}{2} \times 4\frac{3}{4}$	10 10 0	0 19 0	1 10 0	$8\frac{1}{2} \times 8\frac{3}{4} \times 1\frac{1}{2}$	3 6	$14\frac{1}{2}$	1 13 9
$8\frac{1}{2} \times 6\frac{1}{2}$	12 10 0	1 4 0	1 15 0	$10\frac{1}{2} \times 10\frac{1}{2} \times 1\frac{1}{2}$	4 6	18	2 0 0
* 12×10	18 0 0	1 16 0	2 10 0	$14\frac{1}{2} \times 14\frac{1}{2} \times 2\frac{1}{2}$	8 12	27	2 17 0
* 15×12	22 10 0	2 12 0	2 19 6	$17\frac{1}{2} \times 17\frac{1}{2} \times 3$	13 9	33	3 11 6

PRICES STRICTLY NET for Cash.

Other sizes to order.

CC

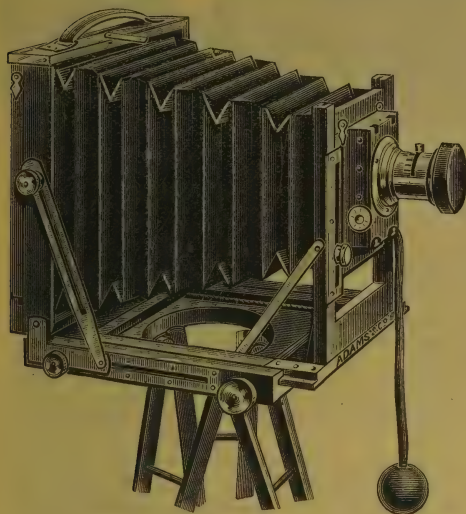
* The 12×10 and 15×12 are very special instruments, having leg supports for front, and focussing is done from screw situated at back. This is of immense advantage.

Lenses specially suitable, but any make supplied.	ADAMS "CLUB" Guaranteed to pass Kew tests.	ROSS. Sym. Anastigmat.	GOERZ. Series Ic, f. 6.3.	ZEISS VIIa. 2 foci, f. 6.3.
	£ s. d.	£ s. d.	£ s. d.	£ s. d.
$6\frac{1}{2} \times 4\frac{3}{4}$	3 7 6	4 15 0	5 10 0	9 15 0
$8\frac{1}{2} \times 6\frac{1}{2}$	4 5 0	7 12 0	7 0 0	15 5 0
12×10	4 15 0	12 16 6	..	35 10 0
15×12	7 15 0	23 6 0	..	84 10 0

Adams & Co.'s "Amateur" Set.

THE BEST OF ALL THE CHEAP SETS.

$\frac{1}{2}$ plate outfit complete £3 10s. net, only.



MAHOGANY CAMERA.
REVERSING BACK.
RACK & PINION.
LONG EXTENSION.
RISING FRONT.
SWING BACK.
BACK SLIDES FORWARD
FOR USING WIDE ANGLE
LENSES.
DOUBLE DARK SLIDE.
RAPID RECTILINEAR
LENS
WITH IRIS DIAPHRAGMS.
ROLLER BLIND SHUTTER,
Time and instantaneous
with speed indicator.
THREE FOLD TRIPOD
STAND.
TURNTABLE.

This is a most popular set, and has lately grown into great favour with the public, and is a practical and reliable outfit. The public are warned that it is necessary to see our name upon the Cameras to avoid unreliable imitations.

A good, strong, serviceable Camera, of cheaper quality than our well-known "Club." It possesses all useful movements, and is got up in a cheap and popular form. Although issued at a very low price, it is reliable in every particular, and can be relied upon to afford satisfaction.

It has been specially designed and introduced for those who want a good outfit at a low price. Without the unnecessary complications which so often lead to disaster with cheap Cameras, it has yet all the movements desired by practical workers. It is made of well-seasoned mahogany, with Leather Bellows, Swing Back, and Rising Front. The Dark Slide is well made throughout. The Lens is of rapid rectilinear form, giving good marginal definition. The Tripod is well made, three fold, and rigid. The Camera is also specially adapted for using with wide angle Lenses.

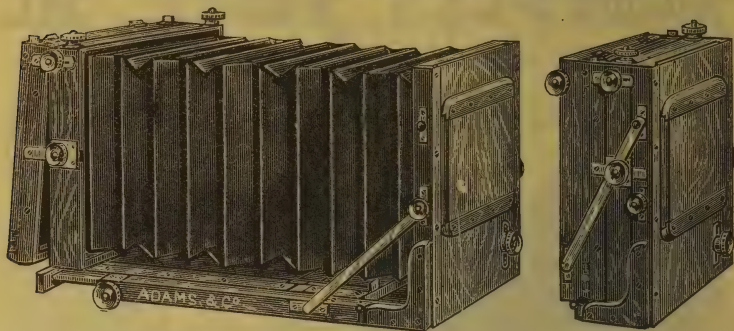
If fitted with our best quality "Club" Rapid Rectilinear Lenses, guaranteed to pass Kew tests,

Strictly Net Prices.				
"Amateur" Set complete	..	$\frac{1}{4}$ plate, £3 0 0	..	£1 17 6 extra.
"	..	$\frac{1}{2}$ plate, 3 10 0	..	2 10 0 "
"	..	$\frac{3}{4}$ plate, 5 10 0	..	3 3 0 " CB

Extra Slides, $\frac{1}{4}$ plate, 8/6; $\frac{1}{2}$ plate, 9/-; $\frac{3}{4}$ plate, 15/-.

*The $\frac{1}{4}$ plate set is not fitted with turntable, and shutter is on front of lens.

Adams "Challenge."



Long focus, square bellows. A strong, serviceable pattern of best make and finish.

FOR all-round and especially professional work. Having full-sized square bellows, it is particularly adapted for the use of various lenses, from wide angle to long focus, without risk of bellows cutting off. It is strong, portable and convenient, and, if brass bound, will stand any climate.

Our own Manufacture, and of Highest Quality and Workmanship.

The best square Camera with latest useful improvements, and will meet every requirement of tourist and landscape photographers. Made of finest seasoned mahogany, best leather bellows, double swing back, hinged focussing frame, rack and pinion adjustment for focussing, three double backs with improved folding shutters, and hinged metal divisions, with reversing back for taking pictures either way without removing Camera. Has double extension to focus, giving long range, and rising and falling front. This model is probably the most practically useful all-round Camera there is, and the demand for it increases steadily. Made only in first class quality and workmanship, is exceedingly simple in design, can be easily set up and taken down, and is perfectly rigid and steady when in use. After the Camera has been drawn out to its usual extent and clamped, it can then by means of screw or rack adjustment, be extended two-thirds of the length of the baseboard more.

CB

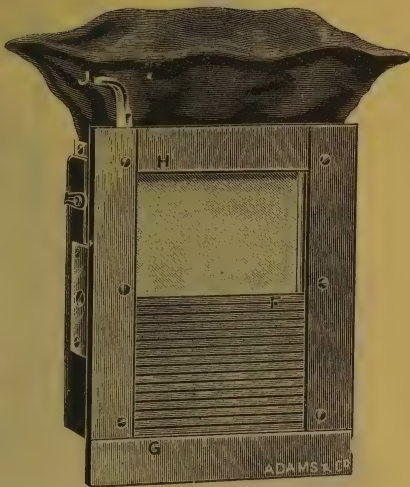
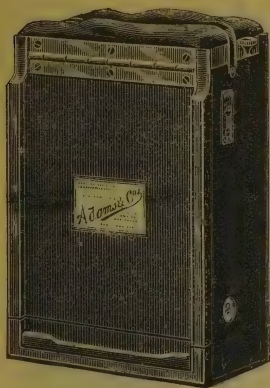
	$6\frac{1}{2} \times 4\frac{3}{4}$	$8\frac{1}{2} \times 6\frac{1}{2}$	12×10	15×12
Cameras and 3 double slides - -	£9 0 0	£12 0 0	£16 0 0	£19 10 0
Adams "Club" Rectilinear Lens, with Iris diaphragm, guaranteed to pass Kew tests* - -	3 4 2	4 0 9	5 9 3	7 7 3
			2 CASES.	
Solid Leather Travelling Case, with spring lock - - - -	1 13 9	2 0 0	4 0 0	6 8 3
Folding Tripod Stand - - - -	1 2 6	1 6 6	2 2 0	2 10 0
Time and Instantaneous Shutter, with Speed Indicator - - -	0 15 3	0 17 2	1 1 0	1 3 9
	15 15 8	20 4 5	28 12 3	36 19 3
Extra Dark Slides, each - - -	0 19 0	1 4 0	1 16 0	2 12 0
Brass Binding for tropical climates	1 10 0	1 15 0	2 10 0	3 0 0
Wide Angle Rectilinear Lens -	3 0 0	3 9 0	4 19 9	5 19 9

* Any article may be purchased separately; or left out from the set if desired and cost deducted, or any other Lens, etc., substituted. The prices are strictly net for cash.

New "Adams" Plate or Film Changing Box.

CAN BE FITTED TO NEARLY
ALL CAMERAS.

PATENT.



AN entirely new Changing Box, embracing the combined advantages of the best systems. Takes twelve plates or twenty-four films, and either may be used in the same box.

One novel feature is, that it is fitted with a roller blind shutter, which is moved from the back. Thus plates can be covered or uncovered at will, and without being obliged to change a plate when doing so. In previous boxes the rollable shutter has been the lifter, and it was not possible to close or detach such boxes without changing a plate, which, if it had not been exposed, meant being deprived of its use, and generally, owing to confusion in keeping count, wasting it. In the new "Adams" Box this most troublesome inconvenience has been overcome, as there is a separate lifter provided for raising the plates quite independently of the rollable shutter.

Neither in this new box have we any light traps to get out of order, and there is no separate ebonite or metal draw-out shutter to be troubled with. Even the door is hinged, thus avoiding loose parts and fittings of every kind. An automatic indicator is fitted, showing number of plates exposed. The bags used are of special quality leather, being pliable and completely free from the slightest dust, and will stand constant wear for many years. Plates are lifted from front and placed after exposure at back. When box is opened in dark room the last plate is one last exposed. This avoids having to empty the whole box to get at the front plates when only one or two have been exposed, and it is desired to develop or remove them.

Easily fitted to nearly all cameras. They are of best finish, in polished mahogany, and of $\frac{1}{16}$ ths of an inch register, most slides now being of this thickness, but $\frac{1}{4}$ in. can be supplied if specially ordered. This pattern is sent out with a large front, in order that it may be cut down to any required size. The cost of fitting to cameras according to work required, but not more than 2/6. A reversing back and slide should be sent if we have to fit.

PRICES. Include 12 steel sheaths, either for films or plates. The plate sheaths take 12 plates or 12 films. If to take 24 films, the cost of the additional sheaths are as below.

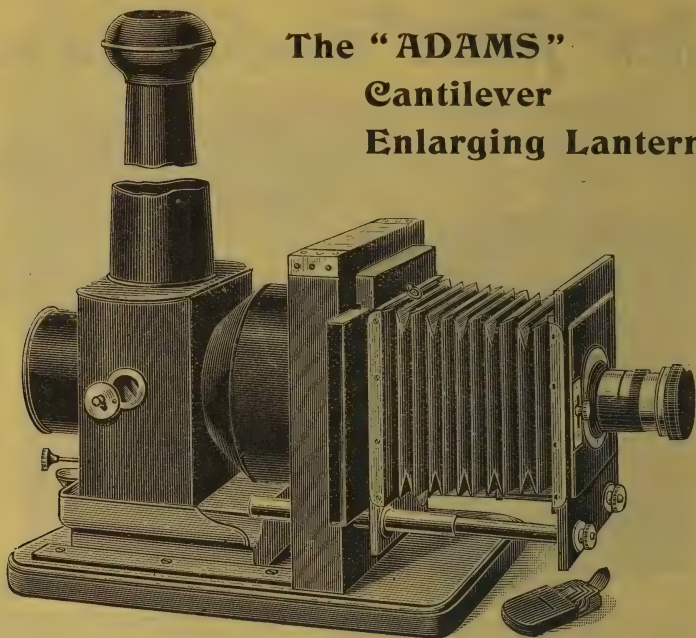
Net Prices $\frac{1}{4}$ pl. £2 12s. 6d.; $\frac{1}{2}$ £3 3s. 0d.; $\frac{3}{4}$ £3 17s. 6d.

Best finish and prepared steel sheaths, per doz. $\frac{1}{4}$ pl., 4/-; $\frac{1}{2}$ 5/-; $\frac{3}{4}$, 7/6.

ALUMINIUM do, do. $\frac{1}{4}$ pl., 6/6; $\frac{1}{2}$ 8/-; $\frac{3}{4}$, 15/.

CC**

The "ADAMS" Cantilever Enlarging Lantern.



THIS Enlarging Lantern, which is made on the Cantilever principle, is of the very highest efficiency, both as regards manufacture and principles involved. The wood parts are made of walnut, tongued together and brass bound at corners. The lamp is made of Russian iron, and is supplied with a very powerful burner, which can be regulated from the outside, a small peep-hole being provided for the purpose. The lamp can also be re-filled from outside, and is provided with a spherical reflector. The condenser is of best white glass and of high power, being compound-plano-convex.

The lantern is provided with rising front, long extension bellows, and reversing negative holder, so that enlargements can be made either way at will.

The lenses supplied are best quality projection lenses, fitted with rack and pinion, and orange glass cap for exposing.

Can also be supplied so as to take limelight, electric light, or incandescent gas, at 15/- extra on all sizes.

We strongly recommend the lantern as a most perfect instrument at a moderate price.

			£	s.	d.
For Negatives, $4\frac{1}{4} \times 3\frac{1}{4}$ (stage receives plates up to $8\frac{1}{2} \times 6\frac{1}{2}$), $5\frac{1}{2}$ in. condenser, without objective			5	12	6
Ditto ditto with $\frac{1}{4}$ -plate lens, $5\frac{1}{2}$ in. focus			6	15	0
For Negatives, 5×4 (stage receives plate up to $8\frac{1}{2} \times 6\frac{1}{2}$), $6\frac{1}{2}$ in. condenser, without objective			7	7	0
Ditto ditto including 5×4 portrait objective, $6\frac{1}{2}$ in. focus			8	10	0
For Negatives, $6\frac{1}{2} \times 4\frac{3}{4}$ (stage receives plates up to 10×8), $8\frac{1}{4}$ in. condenser, without objective			10	10	0
Ditto ditto with $\frac{1}{2}$ -plate lens, 8 in. focus			12	12	0
For Negatives, $8\frac{1}{2} \times 6\frac{1}{2}$ (stage receives plate up to 11 in.), 10 in. condenser, without objective			15	15	0
Ditto ditto with 12 in. focus lens			23	0	0

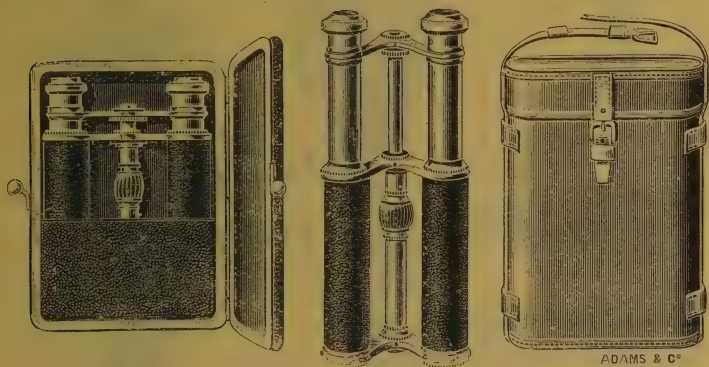
Other sizes to order. Quotations given.

ADAMS & CO.'S

"AMBRA"

Field Glass.

FIVE GUINEAS ONLY.



WE consider this a more convenient Glass than the Binocular Prismatic patterns. It is about *half the weight and half the thickness*, as well as being *much lower in price*, and having a *larger field*. It is also much easier to hold and sight, and may be conveniently carried in the pocket (it being in practically a cigar case), or by means of the very best quality London made Sling Case carried across the shoulder.

Is made with bending bars, thus accurately accommodating itself for all eyes.

It is a new and much improved optical system, and mounted in the ordinary pattern telescopic mounts. It is a Glass we can strongly recommend, and if not approved of after a week's trial, we shall be pleased to exchange for any other of not less value.

One size only. Magnification 8 times. Weight $9\frac{1}{2}$ ozs.

Complete, with Pocket Case as shown above, **£5 5s.** net. Best London made Sling Case, **7/6** extra.

We keep a very large and assorted stock of Field and Opera Glasses from 5/- to £15 15s. od., by Zeiss Ross, Goerz, and other makers.

Comic Backgrounds.

Size 29 x 20 on stout cardboard. Fig. 105B is 24 x 19. The card is held under the sitter's chin, and a white background placed behind.

Price 3/- each; 10% cash discount off three.

Packed flat and sent post free for 1/- each extra. But if more than one is ordered the extra postage will be but 3d. each beyond the 1/-.



FIG. 102B.



Showing method of using. Merely place background on knees.



FIG. 105B.



FIG. 106B.



FIG. 107B.



FIG. 109B.



FIG. 110B.



FIG. 111B.



FIG. 112B.

The Best House for all **PHOTOGRAPHIC SUNDRIES AND REQUISITES.**
 Absolutely fresh Stock and Lowest Discount Prices.
 Send for our 160 pp. Catalogue, post free, 2d., or, better still, favour us with a call.

DISHES—CELLULOID.

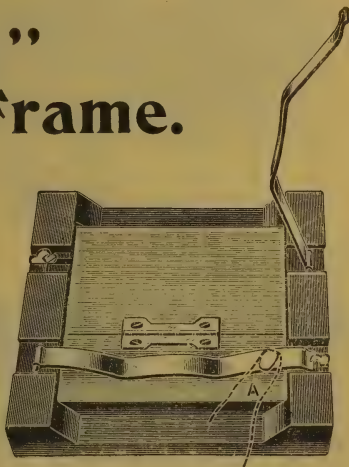


	Assorted Colours.			Transparent.			Transparent with Well.			With Lifter.		
	s.	d.		s.	d.		s.	d.		s.	d.	
3 $\frac{1}{2}$ × 3 $\frac{1}{2}$	-	-	0 4	-	-	0 7	-	-	0 10	-	-	..
3 $\frac{1}{2}$ × 6 $\frac{1}{2}$	-	-	0 7	-	-	1 2	-	-	1 6	-	-	..
4 $\frac{1}{2}$ × 3 $\frac{1}{2}$	-	-	0 4 $\frac{1}{2}$	-	-	0 9	-	-	0 11 $\frac{1}{2}$	-	-	0 6 $\frac{1}{2}$
5 × 4	-	-	0 5 $\frac{1}{2}$	-	-	1 0	-	-	1 3	-	-	0 8 $\frac{1}{2}$
6 $\frac{1}{2}$ × 4 $\frac{1}{2}$	-	-	0 7	-	-	1 2	-	-	1 6	-	-	0 9
7 $\frac{1}{2}$ × 5	-	-	0 9	-	-	1 8	-	-	2 0	-	-	..
8 $\frac{1}{2}$ × 6 $\frac{1}{2}$	-	-	0 10 $\frac{1}{2}$	-	-	1 8	-	-	2 6	-	-	1 2
10 × 8	-	-	1 1 $\frac{1}{2}$	-	-	2 6	-	-	3 0	-	-	..
12 × 10	-	-	3 4	-	-	..	-	-	..	-	-	..
15 × 12	-	-	4 8	-	-	..	-	-	..	-	-	..

“Automatic” Printing Frame.

Made with hinged spring, which entirely obviates the movement of paper when examining during printing. Open and closed at once. Well made of teak with brass springs.

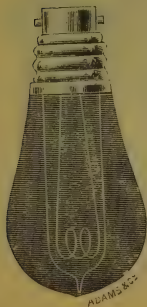
1 plate	-	-	each	5 $\frac{1}{2}$ d.
5 × 4	-	-	..	7 $\frac{1}{2}$ d.
1 plate	-	-	..	11d.
7 $\frac{1}{2}$ × 5	-	-	..	1/6
1 plate	-	-	..	1/10
10 × 8	-	-	..	2/4
12 × 10	-	-	..	3/-
15 × 12	-	-	..	4/6



“AMBRA” Electric Lamp.

A very good, useful and convenient Lamp, complete with Incandescent Lamp, 5/-. Postage, 2d.

Can be supplied with either Ruby or Orange Globes, and for 100 or 220 volts.



Adams & Co.'s "Zephyr" Portable Hand Camera Stands

(First quality patterns).

MADE of triangular tubular aluminium. Quite rigid, portable, and light. Instantly erected without a single adjustment. Closed as quickly. Adjustable to different heights. Regulation $\frac{1}{4}$ Whitworth screw is supplied.



Closed. Open. Weight. Net.
No. 1. 14 $\frac{1}{2}$ in. 49in. 15 ozs. 30/-

Leather Case, 5/6.

No. 2. 16in. 58 $\frac{1}{2}$ in. 18 ozs. 35/-

Leather Case, 6/6.

No. 3. 34in. 60in. 15 ozs. 30/-

No. 3 is a walking stick (see Fig. 2).

No. 4. Circular Aluminium

legs, 2nd quality
14in. 47in. 12 ozs. 20/-

No. 5. Do., do., Brass

14in. 47in. 26 ozs. 12/6

Leather Cases for Nos. 4 and 5, 4/- each.

No. 6. New cheap pattern for
small or folding Cameras.
Opens to 40 in., closed 16 in.,
weight 15 ozs. 5/- net.

When required for other than
small pocket Cameras, we recom-
mend an additional 3in. top, 1/6
extra. For Nos. 1, 2, and 3 pat-
terns only.

CC**



FIG. 2.

Adams & Co.'s View Meter.

Same Meter answers for large
variety of Lenses.

Gives exactly same angle as lens
in use. For all classes of work it is
of enormous advantage, for the exact
view that would be on the plate from
the position of the operator may be
at once seen without the trouble or
necessity of erecting the camera. It
also enables the operator to tell at a
glance what would be the best angle
lens to use in order to obtain the most
artistic rendering of his subject, and
also shows the exact spot where it is
necessary to place the camera in
order to embrace any particular sub-
ject on his plate.

Made of Aluminium.

Price 12/6; postage 3d.

CC**



ADAMS & CO LONDON

THE "ADAMS" TELEMETER

NEW "BRILLIANT VIEW" PATTERN.

A Telemeter enables one to tell the distance at which any object is, and its use will at once be apparent in connection with the very large class of hand cameras which focus by scale.

The Telemeter is held to the eye like a miniature telescope and focussed on a given object, when by consulting the outside of the eye-piece a spiral line on the inner tube will be found, which tells the distance in yards of the object focussed.



Price,

7/6 net.

Postage, 2d. CC**

The 'A1' Koreesco.



**ADAMS & CO.'S
Pattern has
Rising Front,
Detachable
Baseboard,
and
Removable
Lens Panel.**

Rising front permits any portion of negative being enlarged to full size.

Whole-plate enlarges from Pocket Kodak or $\frac{1}{4}$ -pl. to $\frac{1}{2}$ or Whole-plate. You can reduce Whole, $\frac{1}{2}$ -pl, $\frac{1}{4}$, or $3\frac{1}{4} \times 3\frac{1}{4}$. 15×12 enlarges any size up to 15×12 from $4\frac{1}{4} \times 3\frac{1}{4}$ or $\frac{1}{2}$, also reduces 15×12 , or less, to $\frac{1}{2}$, $\frac{1}{4}$, or $3\frac{1}{4} \times 3\frac{1}{4}$.

Camera, Rack Focus arrangement ($3\frac{1}{4}$ focus), Achromatic Lens, $\frac{1}{4}$ -pl. Book Slide, $\frac{1}{2}$ -pl. Carrier, and $\frac{1}{4}$ -pl. Slide with Carrier.

For Enlarging and making Lantern Slides, **35/-**.

15×12 includes Camera, Rack Focus arrangement (one $3\frac{1}{4}$ and one $8\frac{1}{2}$). Achromatic Lenses, 16×13 single Slide, 15×12 , 12×10 , 10×8 , $\frac{1}{2}$, $\frac{1}{4}$, and $\frac{1}{8}$ Carriers, Board to carry 16×13 , or smaller sizes of paper, $\frac{1}{2}$ -pl. single Slide with $\frac{1}{4}$ -pl. and Lantern Slide Carriers, for reducing to $3\frac{1}{4} \times 3\frac{1}{4}$, $\frac{1}{4}$ -pl., or $\frac{1}{8}$ -pl.

Price complete, **80/-**.

C

BINOCULAR PANTOSCOPE.

Does not require Stereoscopic Slide, but ordinary Lantern Slide. Fitted with two powerful Prismatic Lenses, which magnify *nearly double*.

Can be focussed for different sights. Sliding carrier is fitted.

The No. 1 is arranged for quarter-plate prints as well as Lantern Slides, and has a raising mirror. It is also constructed to take the *Chromoscope*.

Price of No. 1 is **33/3**. Including detachable CHROMOSCOPE, **44/3**, less 5 per cent. Cash Discount.

THE CHROMOSCOPE

is an instrument which gives a variety of graduated tinted effects to the slides, and is wonderfully pretty and effective. Sunrise, sunset, and a variety of cloud and sea effects are also obtained. We most strongly recommend this addition, as the pleasing and artistic effects obtained are almost incredible.

Price 11/-, 5 per cent. Cash Discount.

CC**

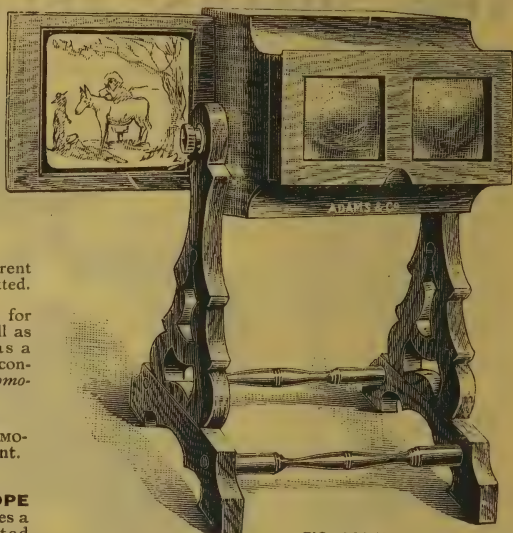
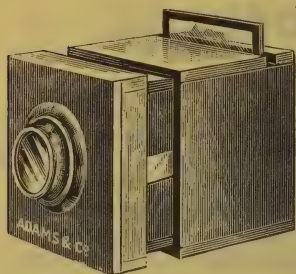


FIG. 632 H.



THE "POPULAR PANTOSCOPE."

5/6 only, less 10 per cent. for Cash.
Postage 4½d.

CC**

ADAMS & CO.'S

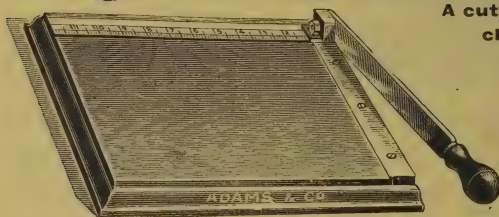
"SHEAR-CUT" CUTTING TABLE.

A cutting board that cuts
cleanly and easily.

Much better than Knives
and Cutting Shapes.
No sharpening required,
and prints can be trimmed to *any size*, with a
certainty of being
square.

Cutting all sizes up to
7 in., 7/6; 9 in., 9/-;
12 in., 15/6.

CC**



The "ADAMS" Finder.

GIVES A BRILLIANT, STATIONARY,
ACCURATE IMAGE.

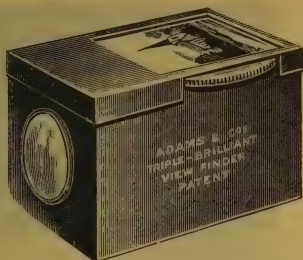
The nearest PERFECT Finder.

OVER 100,000 SOLD.

"AJ" shows 2 views, horizontal and vertical.

"BJ" one view, either horizontal or vertical.

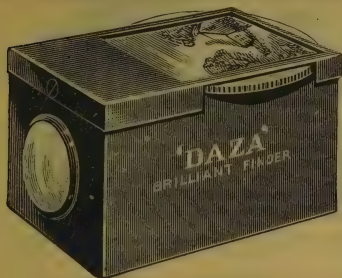
Size. No.	View seen.	Size of Image × Plate	Pattern.		
			AJ.	BJ.	
" 1	..	$\frac{1}{2} \times \frac{1}{8}$	10/6	7/6 each	} Postage 2d.
" 2	..	$\frac{1}{2} \times \frac{3}{4}$	13/6	12/-	
" 2	In Aluminium	..	15/6	14/-	
" 3	..	$1\frac{1}{4} \times 1\frac{1}{4}$	17/6	15/-	
" 3	In Aluminium	..	20/-	17/6	



The "ADAMS" Brilliant Finder is the only one capable of giving the exact and accurate view as obtained upon the plate, unless a much longer focus lens is used than usual. NONE of the imitations can possibly show the amount given by a 5 in. on a $\frac{1}{4}$ plate, 6 in. on a $\frac{1}{2}$, and so on. They only show about two-thirds of the proper view, and are most misleading. The "ADAMS" Finder can be fitted to most Cameras, and whatever instrument is purchased, instructions should be given that it must be fitted with the "ADAMS" Finder.

We undertake fitting them to existing Cameras.

CC**



The Adams "Daza" Finder

The best low-priced Finder obtainable.

A modification of the famous
"ADAMS."

Revolving Wheel gives horizontal
or vertical view.

5/- each. Postage 1d. CC**

The Adams "Rectiflex" Finder.

View is shown **right way up**, also correct from **right to left**. Picture is thus seen as it actually appears.

Reflecting mirrors are silvered in optical contact upon prism; thus there is no dust and no objectionable reflection from lens surfaces.

The same FINDER shows horizontal as well as vertical view.

Neat small fittings are supplied, with screws, for the easy attachment to either hand or stand cameras.

Is most handsomely finished in nickelled German silver.



Price 21/-

CC**

"KENSINGTON" MASKS & DISCS.



Extremely effective, especially in larger sizes. Two series of 8 different artistic designs each, Nos. 1 and 2, including Palettes, Shell, Floral Designs, Vases, Easel, Heart, etc., etc. $\frac{1}{4}$, $\frac{1}{2}$, and whole-plate, each containing an assortment of 8 different designs. Price, 1/- per packet; postage 1d.

CCB

ADAMS & CO.'S

Lantern Slide-Frame.

Registered No. 163,571.

Any part of negative may be selected, even the extreme corners. Should any part of picture be out of upright, it can be adjusted, and the lantern plate cannot slip or get scratched. Takes any size up to $1\frac{1}{2}$ plate.

CC

Price 3/9, postage 6d.

Polished mahogany and best finish 6/6, postage 6d. Carriers, $\frac{1}{4}$ and $\frac{1}{2}$ -plate, 6d. the two.

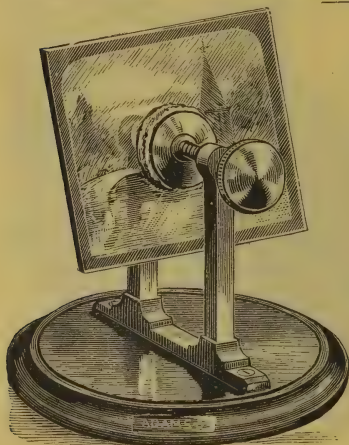
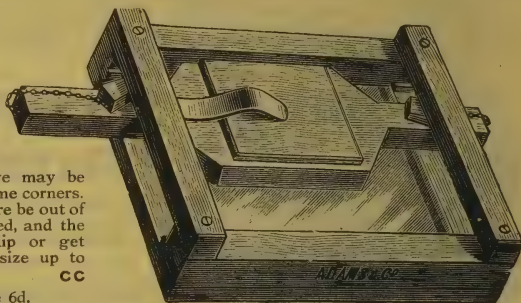


FIG. 601H.

ADAMS & CO.'S

Revolving Vices

For facilitating the troublesome operation of binding lantern slides.

The rubber cheeks of this machine press the slide, mat, and cover glass into close contact; the whole can then be revolved. This leaves both hands at liberty for manipulating the gummy binding slip, which can then be more readily and neatly applied, as there is no possibility of the glasses slipping.

Fig. 601H. 4/-

Extra Finish and Nickel - - - 5/-

Postage 6d.

CC

Adams & Co.'s "AMBRA" MOUNTS.

The most effective and neatest Mounts ever designed. Exceedingly attractive and first-class quality. Useful as a Show Mount or for Exhibition Purposes. We strongly recommend clients to send for at least one in order that they may judge of their extreme suitability, where a really good and effective display Mount is required.

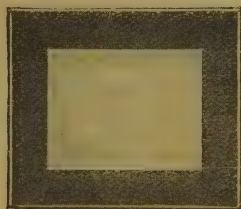
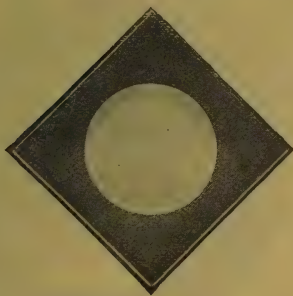


In 2 colours—Havane-Brown and Dark Green.

A very thick Mount with a deep bevelled opening, bound white. The outside edge is also bound white and bevelled. On this is laid a matt of one of the above two colours, leaving a small margin of white round the opening. There is also a half-inch matt of similar colour inside the bevel. A backing board is supplied with each mount.

With circular opening for cabinet heads	-	-	-	-	-	each	1/3
„ square	„	1/4, 1/2, cab. or 1/2 pl.	-	-	-	„	1/3
„	„	8 x 6	-	-	-	„	2/6
„	„	11 1/2 x 9 1/2	-	-	-	„	4/-
„ 3 1/4-pl. openings on view	-	-	-	-	-	„	5/-
„ 3 1/4-pl.	„	-	-	-	-	„	5/-
„ two circular cabinet openings side by side	-	-	-	-	-	„	3/-
„ one square cabinet opening and one circular do. on each side	-	-	-	-	-	„	5/-
„ 12 in. circular opening	-	-	-	-	-	„	6/-

"KAMLO" SLIP-IN MOUNTS.



"KAMLO" CIRCLE.

2 1/2	-	1/4 doz.	9/6	100
3 1/2	-	1/7 „	11/4	„

"KAMLO" SQUARE.

3 1/2 sq.	-	rod. doz.	6/3	100	1/2 pl.	-	rod. doz.	6/3	100
C. D. V. or	}	9d.	„	5/9	„	1/2	„	1/5	„
F. P. K.									

"KAMLO" Colours : Dark Green and Brown.

BACKGROUNDS AND LANTERN SCREENS

EASILY ERECTED ANYWHERE.

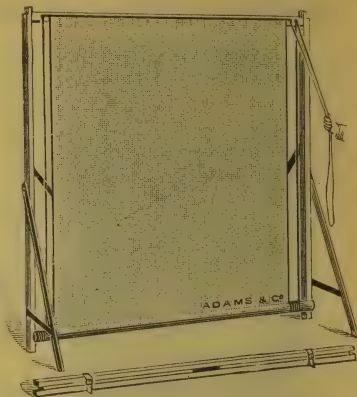
Less 10 per cent. Cash Discount with order.

	On Roller.	With Lath Roller and Pulley. (See Illus.)	Port. stand Extra. (See Illus.)
6×4	- 4/5	- 9/6	- } 11/-
6×5	- 5/6	- 11/6	- }
8×6	- 7/9	- 15/-	- }
8×7	- 10/-	- 19/6	- }
8×8	- 12/6	- 22/-	- }

LANTERN SCREEN.

	On Roller.	With Lath Roller and Pulley. (See Illus.)	Port. Stand Extra.
6×6	- 5/6	- 11/-	- 11/-
8×8	- 9/6	- 17/6	- 16/6
9×9	- 11/-	- 19/6	- 20/-

E



"CLUB"

LANTERN SCREENS

Beautifully smooth and quite Opaque. They are supplied on rollers with pulleys and cords complete, ready for use.

6 ft. × 6 ft. 22/-; 7 ft. × 7 ft. 25/-; 8 ft. × 8 ft. 27/6
9 ft. × 9 ft. 33/-; 10 ft. × 10 ft. 39/-;
12 ft. × 12 ft. 58/6; 15 ft. × 15 ft. 110/-.

Net Prices.

CC



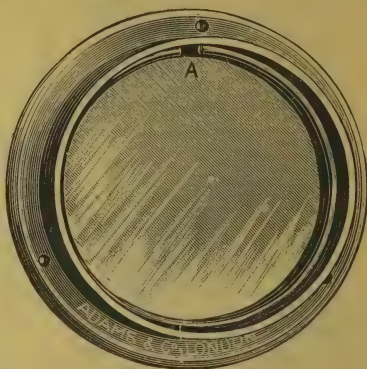
ADAMS & CO.'S ISOCHROMATIC SCREENS.

Issued at a reasonable price.

Merely wants screwing in the Camera behind the Lens. There is a small loose spring, shown in the illustration, which is easily withdrawn and inserted, and holds the glass or glasses tightly. Holder is of aluminium.

	Prices of Screens only.	Complete with Holder & Case for Screen.
No. 1, 2 in. diameter	2/-	- 5/-
No. 2, 2½ in. "	3/-	- 6/-
No. 3, 3 in. "	4/-	- 7/6

The No. 1 density Screen increases the exposure about 2½ times, No. 2, 5 times. E



ADAMS & CO.'S "CHALLENGE" LEVEL

(Reg. No. 138,687)

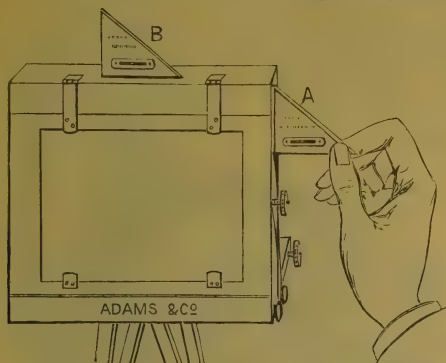


FIG. 1H.

Is the only practical Level. When an ordinary Level is placed on top of a Camera, it cannot be seen without using a stool or ladder, it being too high. The "Challenge" Level is seen right through, and it may be placed against *side* of Camera also, or against focussing screen to see that it is truly perpendicular. It thus answers the purpose of Level and Indicator. It is small enough for the vest pocket.

Price 2/6 each. Postage 1d.

E

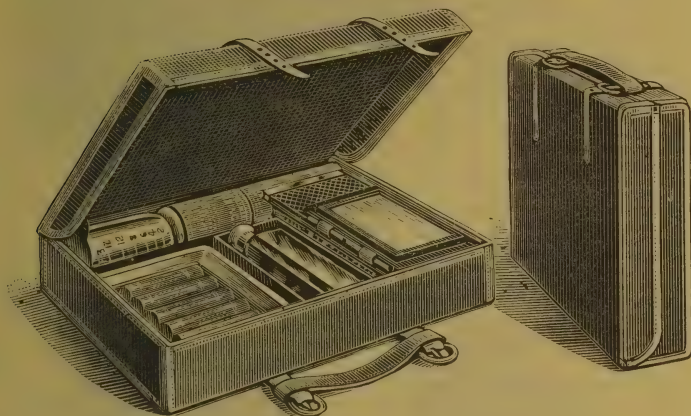


FIG. 2H.

The TRAVELLER Printing and Developing Outfit.

$\frac{1}{4}$ -pl. measures only 11in. \times 8in. \times 2 $\frac{3}{4}$ in., and weighs complete 3 lbs.
 5 \times 4 " " 14in. \times 9 $\frac{1}{2}$ in. \times 2 $\frac{1}{2}$ in., " " 5 $\frac{3}{4}$ lbs.

A most useful outfit, especially for developing when away from home. It contains everything necessary for printing and developing a large number of negatives, and all the chemicals are easily replaced when exhausted.

$\frac{1}{4}$ -plate 21/- Net. $\frac{5}{4}$ -plate 27/6 Net.

CC

“MINNI” Changing Tent. Weighs 3 lbs.

THIS will be found useful for changing all kinds of Plates or Films, including those of the larger sizes. The Tent is constructed of a three-fold thickness of specially selected material, and is supported on a polished mahogany frame with brass fittings. When extended it is quite rigid and very strong. No. 1 size, open— $20 \times 20 \times 20$; closed, $22 \times 4 \times 3$. Weight 3 lbs. Price **18/6**. No. 2 size, open— $25 \times 23 \times 23$; closed, $27 \times 5 \times 3\frac{1}{2}$. Weight 4 lbs. Price **21/6**. C

ADAMS & CO.'S

“Challenge” Dark Tent.

THIS Tent is specially recommended for travellers, as it is substantially made, and will stand much rough usage. It is made in the form of a neat case, the sides of which form the rigid sides of the tent. It is fitted with a window on runners, so that white light may be obtained if desired. It is suitable for developing any size plates up to $8\frac{1}{2} \times 6\frac{1}{2}$.

Size, $24 \times 17 \times 5$.

Price **£2 12s. 6d.** net.

Strong Tripod for same,
£1 7s. 6d. CB

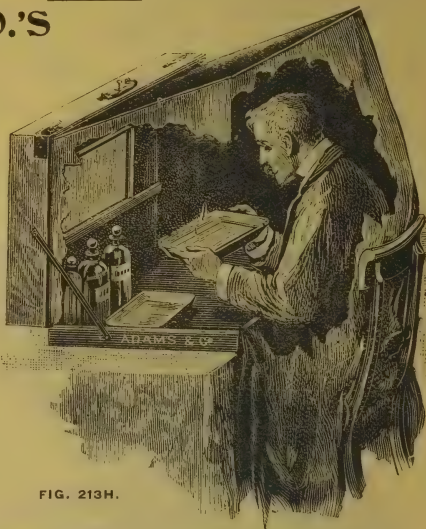
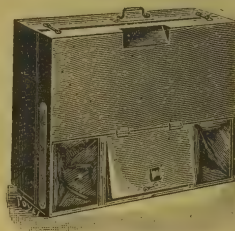


FIG. 213H.

The “Develobox”—a Portable Dark Room.

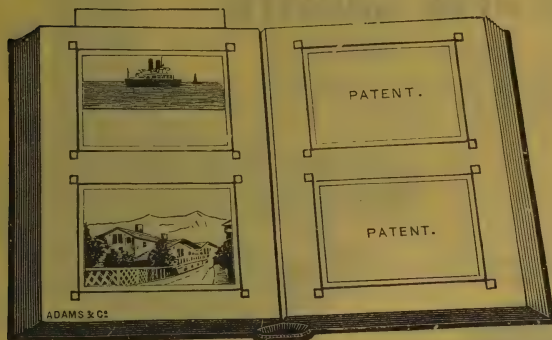
ADAPTED for changing and developing conveniently in a room or out of doors. The head is outside the box, and yet plates are safe inside.



It provides plenty of safe light, and the manipulation of changing or developing can be conveniently seen. Admirable for touring. Takes any plates up to $7\frac{1}{2} \times 5$. Measures, closed, $19\frac{3}{4} \times 4 \times 14\frac{1}{4}$, and weighs $7\frac{3}{4}$ lbs.

Price, complete with developing dish, **£3 10s. 0d.** net. CB

Adams & Co.'s "Club" Mounts & Albums.



Simply Slip in.

No Trimming or
Mounting
required.Exceptionally
Low Prices.

CC†

CC†

No. 1. Series.

(Plate-sunk, India tint.) Cloth Binding.

No.	Holds.	Size.	No. on Page.	Price.	Post.
462	12	3¼ sq.	1	8d.	2d.
475	24	"	2	1/4	3d.
441	12	¼-pl.	1	1/-	3d.
435	24	"	2	1/10	3d.
492	48	"	4	2/6	4d.
464	12	5×4	1	1/3	3d.
466	12	Cabt.	1	1/10	3d.
438	12	½-pl.	1	1/10	3d.
490	12	7×5	1	2/2	3d.
467	12	1/1-pt.	1	2/9	4d.

Half Morocco and Gilt Edges.

463	48	3¼ sq.	1	5/-	4d.
474	96	"	2	6/6	4d.
442	48	¼-pl.	1	5/-	5d.
400	96	"	2	7/-	6d.
491	192	"	4	10/6	9d.
465	48	5×4	1	6/6	6d.
482	48	Cabt.	1	6/9	6d.
418	48	½-pl.	1	6/9	6d.
468	48	1/1-pl.	1	11/6	9d.

No. 3 Series. (Tinted Margin.)

485	24	¼-pl.	1	1/-	3d.
477	48	"	2	1/9	3d.
498	24	Cabt.	1	1/6	4d.
486	24	½-pl.	1	1/6	4d.

No. 2 Series. (As illustrated.)

Cloth Binding, Blocked Gold.

430	12	3¼ sq.	1	10d.	3d.
395	12	¼-pl.	1	10d.	4d.
402	24	"	2	1/2	4d.
399	48	"	4	2/-	4d.

No.	Holds.	Size.	No. on Page.	Price.	Post.
396	12	5×4	1	1/2	4d.
406	12	Cabt.	1	1/3	4d.
397	12	½-pl.	1	1/3	4d.
423	12	7×5	1	1/8	4d.
398	12	1/1-pl.	1	2/-	4d.

Half Morocco and Gilt Edges.

429	48	3¼ sq.	1	3/3	4d.
367	48	¼-pl.	1	3/3	4d.
366	96	"	2	4/3	5d.
365	192	"	4	7/6	7d.
376	48	5×4	1	4/-	5d.
403	48	Cabt.	1	4/-	5d.
369	48	½-pl.	1	4/3	5d.
493	96	"	2	9/-	7d.
420	48	7×5	2	6/-	6d.
419	96	"	2	8/-	9d.
370	48	1/1-pl.	1	7/3	7d.

NEW "ART" SERIES.Bound Art Vellum Cloth.
Linen Jointed Leaves.
Colours—Dark Green and Brown.**No. 4 Series. Paste on.**

1	24	¼-pl.	1	1/6	3d.
2	24	5×4	1	2/3	3d.
3	48	"	1	3/6	3d.
4	24	½-pl.	1	3/-	3d.
5	48	"	1	4/6	4d.

No. 5 Series. Slip in.

6	24	¼-pl.	1	2/-	3d.
7	48	"	1	3/6	3d.
8	24	5×4	1	3/6	3d.
9	48	"	1	6/6	4d.
10	24	½-pl.	1	3/6	4d.
11	48	"	1	6/6	4d.

Adams & Co.'s "Perfection" Russian Iron Lantern.

COMPACT! LIGHT! PORTABLE!

No. 1. £3 17s. 9d. Less 10% Cash Discount.

No. 2. £1 13s. 6d.

No. 1. Entire brass fronts, best Lenses, compound 4-inch plano-convex Condensers, and fitted with "Club" 4-wick Lamp of marvellous illuminating power, nearly equal to lime-light.

No. 2. Special cheap pattern, with brass front, 4-inch condenser, good lens, and powerful 3-wick lamp.

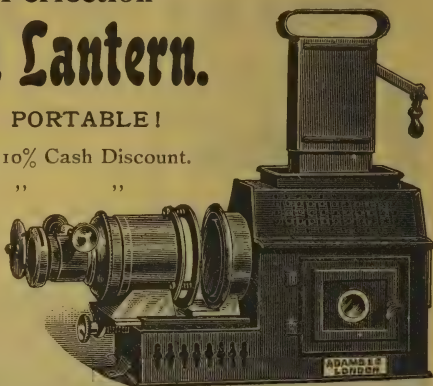


FIG. 302H.

CC

Adams & Co.'s "Club"

Ri-unial Lantern.

Highest quality and finish throughout.

£23 5s. 6d.

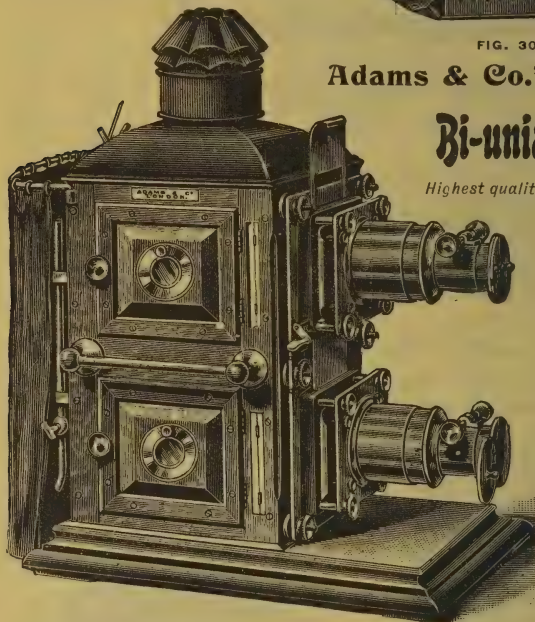
Less 10 p.c. cash.

Complete
with all Fittings.

Made throughout of very best mahogany, panelled doors, entire brass fronts, brass rails, brass supply tubes and bye-pass dissolver, plush velvet curtains at back, 4-in. compound condensers, extra large combination front lenses with interchangeable barrels, pair of best safety blow-through limelight jets and Rack-work Rolling Curtain effect. The whole fitted complete, in strong case, with two locks and keys.

£23 5s. 6d.

Less 10 p.c. cash.



CC

FIG. 305H.

ADAMS & CO.,

26 Charing Cross Road,
LONDON, W.C.

Telegrams:
"BROMIDE, LONDON."

Telephone:
322 HOLBORN.

ESTABLISHED
1834.



G. Houghton & Son,

Works:
Tooting, Surrey.



88 & 89,
High Holborn,
and Dean Street,
LONDON, W.C.

Wholesale and
Export . . .

Photographic



Manufacturers and
Dealers.



COMPLETE PRICE LIST.

842 Pages. 1200 Illustrations.

Post-free, 1/-. Places abroad, 1/6.

THE . . . 'Sanderson' Hand Camera.



'REGULAR' Model.

Perfect for every class of work.

'TOURIST' Model.

Specially designed for Ladies and Travellers.

'DE LUXE' Model.

The *Ultima Thule* of Cameras.

The 1902 Model "Sanderson" Hand Camera is provided with a range of movements and adjustments never before embodied in a single instrument, making it capable of performing the widest range of work. It is, nevertheless, in its main features, simplicity itself, and fulfils all its various functions in a simple, positive and complete manner. The merest novice in photography can use it with satisfaction. In fact, when the Camera is open and the front drawn forward (which can be done in a second or two), the Camera is ready for ordinary use. **All the adjustments for special work are held in reserve, and, except when actually required, need never be touched.**

These special adjustments may be looked upon as a power in hand for work, to which an instrument with a more limited range of adjustment would be quite unequal.



Descriptive Illustrated Booklet and Price List,

56 pages, post-free on application.

FOR PRICES SEE OPPOSITE PAGE.

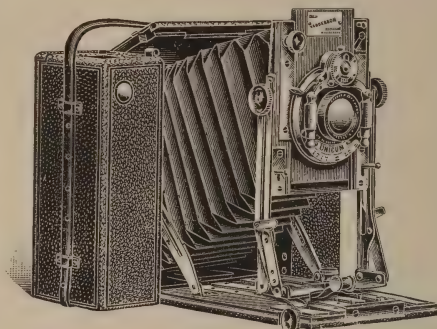
GEORGE HOUGHTON & SON,

Prices of the 'Sanderson Regular,' 'Tourist,' and 'De Luxe' Model Cameras.

No.	DESCRIPTION,	Model	$4\frac{1}{4} \times 3\frac{1}{4}$ in.		5×4 in. or 9×12 cm.		$6\frac{1}{2} \times 4\frac{3}{4}$ in.	
			f.	s. d.	f.	s. d.	f.	s. d.
1	Camera, complete with Special Rapid Symmetrical Lens. Series II., F/8. "Unicum" Shutter, Bright Finder and 3 Double Plate Holders The $\frac{1}{4}$ -plate Camera is fitted with the 6 in. Lens and 5 x 4 Shutter, the 5 x 4 with the $7\frac{1}{2}$ in. Lens and 5 x 4 Shutter, the $\frac{1}{2}$ -plate with the 9 in. Lens and 7 x 5 Shutter.	"Regular" "Tourist" "De Luxe"	6 6 10	17 0 10	7 7 10	6 0 10	10 10 10	6 0 10
1a	Ditto, with "Busch" Detective or Rapid Aplanat Lens. Ditto, ditto The $\frac{1}{4}$ -plate Camera is fitted with the No. 2 Detective Aplanat Lens and $\frac{1}{4}$ -plate Shutter, the 5 x 4 with the No. 2 $\frac{1}{2}$ Detective Aplanat Lens and 5 x 4 Shutter, and the $\frac{1}{2}$ -plate with the No. 3 Detective Aplanat or No. 2 Rapid Aplanat Lens and 5 x 4 Shutter.	"Regular" "Tourist" "De Luxe"	7 7 11	12 5 5	8 8 13	17 10 0	6 0 0	11 11 19
3	Ditto, with "Dallmeyer" Stigmatic Lens. Series II., F/6. Ditto, ditto The $\frac{1}{4}$ -plate Camera is fitted with the No. 2 Lens and $\frac{1}{4}$ -plate Shutter, the 5 x 4 with No. 3 Lens and $\frac{1}{2}$ -plate Shutter, and the $\frac{1}{2}$ -plate with the No. 4 Lens and $\frac{1}{4}$ -plate Shutter.	"Regular" "Tourist" "De Luxe"	11 11 15	17 10 5	14 14 18	10 2 5	0 6 0	19 19 26
4	Ditto, with "Goerz" Double Anastigmat Lens. Series III., F/6.8. Ditto, ditto The $\frac{1}{4}$ -plate Camera is fitted with the No. 0 Lens and $\frac{1}{4}$ -plate Shutter, the 5 x 4 with the No. 1 Lens and 5 x 4 Shutter, the $\frac{1}{2}$ -plate with the No. 2 Lens and $\frac{1}{2}$ -plate Shutter.	"Regular" "Tourist" "De Luxe"	10 10 14	17 10 10	12 12 17	17 10 0	6 0 0	17 17 25
4a	Ditto, with "Goerz" Double Anastigmat Lens. Series I B, F 4.5. Ditto, ditto The $\frac{1}{4}$ -plate Camera is fitted with the No. 0 Lens and 7 x 5 Shutter, the 5 x 4 with the No. 1 Lens and 7 x 5 Shutter, and the $\frac{1}{2}$ -plate with the No. 2 Lens and 9 x 7 Shutter.	"Regular" "Tourist" "De Luxe"	11 11 15	15 7 7	0 6 17	13 7 17	0 6 6	18 17 25
5	Ditto, with "Cooke" Lens. Series III., F/6.5. Ditto, ditto The $\frac{1}{4}$ -plate Camera is fitted with the 5 $\frac{1}{4}$ in. Lens and $\frac{1}{4}$ -plate Shutter, the 5 x 4 with the 6 in. Lens and 5 x 4 Shutter, and the $\frac{1}{2}$ -plate with the 7 $\frac{1}{2}$ in. Lens and $\frac{1}{2}$ -plate Shutter.	"Regular" "Tourist" "De Luxe"	10 10 14	7 0 0	6 11 15	6 5 0	16 15 23	2 0 15
6a	Ditto, with "Beck-Steinheil" Convertible Orthostigmat Lens. Series II., F/6.8. 3 foci. Ditto, ditto The $\frac{1}{4}$ -plate Camera is fitted with the No. 3a lens and 5 x 4 Shutter, the 5 x 4 with the No. 4a Lens and 5 x 4 Shutter, and the $\frac{1}{2}$ -plate with the No. 5a Lens and 7 x 5 Shutter. Camera, complete with Bright Finder and 3 Double Plate Holders, but without Lens or Shutter	"Regular" "Tourist" "De Luxe"	11 11 15	15 7 2	0 6 6	13 13 17	6 10 0	19 18 26
		"Regular" "Tourist" "De Luxe"	4 4 8	17 10 10	5 5 10	17 10 0	6 0 0	8 8 16

The 'Roll Film' Model 'Sanderson' Hand Camera.

For Daylight Loading Roll Films.



The demand for a Camera with the "Sanderson" movements using Roll Films and capable of being loaded and unloaded in daylight, has led to the introduction of the

**"Sanderson"
Roll-Film
Hand Camera.**

This Camera possesses all the advantages of our **"Regular"** Model Sanderson Hand Camera, but is constructed specially to take Spools of Daylight Loading Roll Films.

It is fitted with **two Brilliant View Finders** for upright and oblong pictures, and patented arrangement which very much facilitates the insertion and removal of the spool.

The $\frac{1}{4}$ -plate Camera uses the $4\frac{1}{4}$ in. spool, the 5×4 uses the 5 in. spool, and the $\frac{1}{2}$ -plate uses the 7 in. spool.

A Plate Adapter, complete with Ground-Glass Focussing Screen, and taking the ordinary "Sanderson" Slides, can be supplied, and when it is desired to make use of this, it is only necessary to remove the regular camera back and slide this in its place.

"Roll Film" Model "Sanderson" Hand Camera, complete, with Special Rapid Symmetrical Lens, Series II., $f/8$, Unicum Shutter and two Finders.

$4\frac{1}{4}\times 3\frac{1}{4}$, **£6 17 6.** 5×4 , **£7 17 6.** $\frac{1}{2}$ -plate, **£10 17 6.**

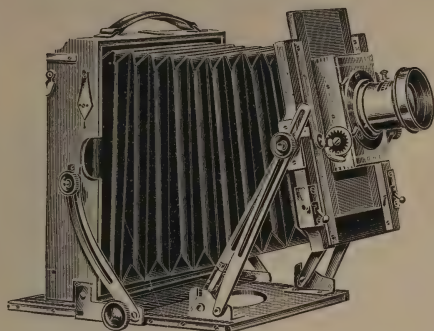
The prices of Sanderson Roll Film Cameras with other Lenses are in all cases the same as the "Regular" Model (listed on p. 3).

Extras.

	$\frac{1}{4}$ -plate.	5×4	$\frac{1}{2}$ -plate.
Plate Adapter, with Ground-Glass Focussing Screen	10/6	10/6	12/6
Double Plate Holders each	3/6	5/0	—
Mahogany Book-form Slides	7/6	8/6	10/6

GEORGE HOUGHTON & SON,

THE "SANDERSON" Popular



Field
Cameras.

The "Regular
Popular."

The "Compact
Popular."

The "**Popular**" series of "**Sanderson**" Cameras, although produced at a very popular price are well and strongly made; the woodwork is thoroughly seasoned and polished, the bellows are of good quality leather, and the brasswork is of good weight and nicely finished. The instruments are, in fact, the very best that can be turned out at the price charged for them.

The only difference between the "**Regular Popular**" and the "**Compact Popular**" is one of focal capacity. While the ordinary $\frac{1}{2}$ -plate "Popular" has a range of from $2\frac{3}{4}$ inches to 21 inches extension, the "Compact" has only from $2\frac{3}{4}$ inches to 14 inches extension, but in no other quality is it different. This should be just the Camera for hundreds of workers who confine their operations to a class of work that does not require the **great** extension possessed by the ordinary "Popular" model.

The "**Sanderson Popular**" Camera Sets, comprise Camera, Dark Slide, R.R. Lens, Thornton-Pickard Time and Instantaneous Behind Lens Shutter, and 3-fold Tripod Stand.

	$\frac{1}{4}$ -plate.	$\frac{1}{2}$ -plate.	$\frac{1}{2}$ -plate.
Complete Set, with R.R. Lens	£4 15 0	£5 10 0	£8 0 0
Ditto, with " Busch " Rapid			
Aplanat Lens	5 15 0	6 12 6	9 5 0
Ditto, with " Busch " " Vade			
Mecum " Universal Set	7 5 0	8 10 0	10 10 0
Ditto, with " Goerz " Double			
Anastigmat Lens, Series III.	9 10 0	12 5 0	17 10 0
Ditto, with " Dallmeyer " Stig-			
matic Lens, Series II.	10 0 0	13 2 6	—
Ditto, with " Cooke " Lens, Series			
III.....	8 10 0	10 10 0	—

Also made in 10×8 , 12×10 and 15×12 .

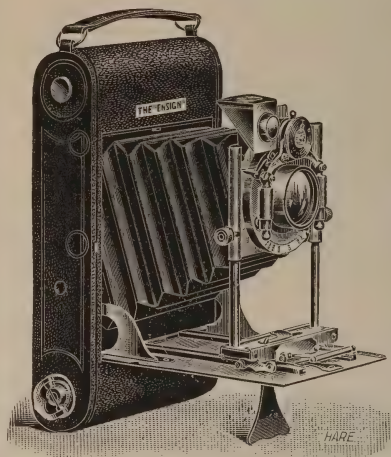
Prices and particulars of "A" Pattern "Sanderson" Field Cameras on application.

88 & 89, High Holborn, London, W.C.

THE....

“ENSIGN” Hand Cameras.

For Plates or Daylight Loading
Roll Films, $4\frac{1}{4} \times 3\frac{1}{4}$.



Model “B” Camera Open for Use.

Models “A” and “B.”

The “ENSIGN” Hand Cameras, Models ‘A’ and ‘B,’ combine portability and lightness, with the advantage of **loading and unloading in daylight.** They are of the popular folding pattern, with falling baseboard and extending front, and can be opened or closed with the greatest ease and rapidity. By a novel arrangement a **Plate Attachment, with Focussing Screen and Slides,** can be fitted to the back, permitting the use of Glass Plates, thus enabling the possessor to use either Plates or Films at will, as may be found desirable.

A Patent Infinity Catch—adjustable for either Plates or Films—automatically fixes the front, when drawn out, at the correct focus for distance—this position being that required for the majority of snap-shot exposures.

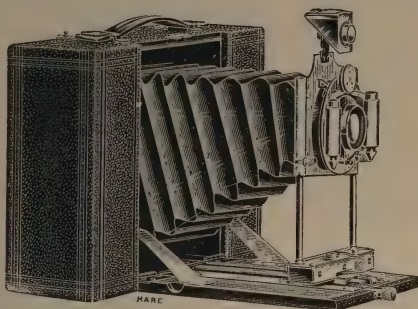
The Model “B” possesses in addition the great advantage of **Rising and Falling Front** for both **Horizontal and Vertical** pictures.

“Ensign” Camera, Model “A,” with Rapid Rectilinear Lens and Time and Instantaneous Shutter.....	£3 12 6
Ditto, Model “B,” with “Bausch & Lomb” Rapid Symmetrical Lens, Series II., 5 in., $f/8$, and Unicum Shutter	5 0 0
Ditto, with “Goerz” Double Anastigmat Lens, Series III., $f/6.8$, No. 0, and Unicum Shutter	9 13 0
Ditto, with “Cooke” Lens, Series III., 5 in., $f/6.5$, and Unicum Shutter	8 10 0
Ditto, with “Beck-Steinheil” Orthostigmatic Lens, Series I., $f/6.3$, No. 3, and Unicum Shutter	9 8 0
Glass Plate Adapter, with Focussing Screen and 3 Metal Single Slides, $4\frac{1}{4} \times 3\frac{1}{4}$, in Envelope Case.....	0 13 6

GEORGE HOUGHTON & SON,

The “ENSIGN” HAND CAMERA.

Model “D.”



—•—•—•—•—•—•—

FOR
DAYLIGHT
LOADING
ROLL FILMS
OR
PLATES,
5×4.

—•—•—•—•—•—•—

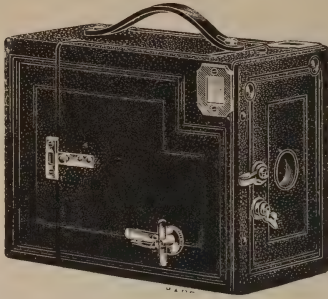
THE “ENSIGN” Camera, Model “D,” is specially made for using Daylight Loading Roll Film Cartridges, but by a novel arrangement, part of the back can be removed and a **Focussing Screen and Slides for the use of Glass Plates** inserted in its place, thus enabling the possessor to use either Plates or Films at will.

The Camera can be **opened ready for use instantly**, as when the front is drawn forward it fixes itself automatically at the correct focus for distance, this position being that required for the majority of snap-shot exposures. **This Infinity Catch** is adjustable for when using either **Plates or Films**.

“ENSIGN” Model “D” Camera, complete with R.R. Lens, Iris Diaphragms, Time and Inst. Shutter, and Brilliant View Finder	£5 5 0
Ditto, with Goerz Lens , Series III., and Bausch and Lomb “Automatic” Everset Shutter	£11 11 0
Focussing Screen and Three Metal Single Slides, 5×4, in Envelope Case	10/0
Extra Single Slides	each 2/0

88 & 89, High Holborn, London, W.C.

THE "SCOUT" HAND CAMERAS.



No. 2 SCOUT.

**For Daylight Loading
Roll Films.**

The No. 1 Scout takes
pictures $2\frac{1}{4} \times 2\frac{1}{4}$.

The No. 2 Scout takes
pictures $3\frac{1}{4} \times 2\frac{1}{4}$.

The Nos. 1 and 2 Scout are beautiful little Cameras, **strongly constructed of well-seasoned wood**, well finished throughout, and covered in fine grain waterproof cloth, equal in appearance to leather, but superior in wear. The outside fittings are nickel-plated, and the ruby window in the back of Camera shows at any time the number of exposures made.

They are fitted with a **Rapid Lens** of excellent quality and covering power, and an **Ever-set Shutter**, giving either Time or Instantaneous exposures.

The **No. 1 Scout** is provided with a good View Finder, and the **No. 2** has two sunk Finders for upright and oblong pictures, and also three sliding stops.

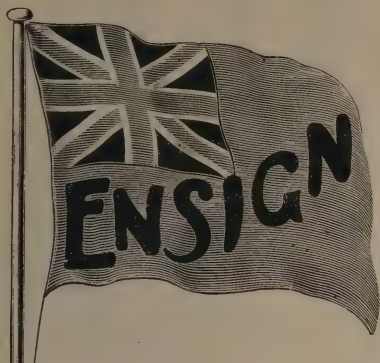
No. 1 Scout , complete	5/0
Stiff Waterproof Case, extra.....	1/6
No. 2 Scout , complete	10/0
Stiff Waterproof Case, extra.....	2/0

The Nos. 1 and 2 "SCOUT" Outfits contain all the necessary articles and materials for Developing and Printing Films.

No. 1 Scout Outfit, complete in box	4/6
No. 2 Scout Outfit	4/6

GEORGE HOUGHTON & SON,

The "ENSIGN" ROLL FILMS.



**Daylight
Loading.**

The "Ensign" Roll
Film Cartridges are
made by

Austin Edwards,
and coated with his
celebrated **Double In-**
stantaneous Emul-
sion.

They are suitable for
use in all ROLL FILM
CAMERAS.

Height of Spool.	Size or Picture.	For Use in Cameras.	PRICE PER SPOOL.	
			12 Exposures.	6 Exposures.
1½ in.	1½ × 2 in.	No. 1 Scout	1/3	
2¼ in. S.	2¼ × 2¼ in.	No. 1 Maxim		
		Folding Little Nipper		7d.
2½ in. T.	2½ × 3¼ in.	No. 2 Maxim		10d.
2½ in. F.P.	2½ × 3¼ in.	No. 2 Scout		
		Folding Pocket Scout		
		Pocket Tribes	1/9	11d.
2½ in.	2½ × 4¼ in.		2/6	1/3
3¼ in.	3¼ × 4¼ in.	Ensign Model A		
		Ensign Model B		
		Pockam		
		Fallorol		
		Challenge Dayspool, Nos. 1 and 2 (½ plate)	3/0	1/6
3½ in.	3½ × 3½ in.	No. 3 B Al Vista	2/6	1/3
4 in.	4 × 5 in.	Ensign Model C		
		No. 4 Al Vista		
		No. 4 B Al Vista		
		Cycam		
		Challenge Dayspool, No. 1 (5 × 4)	3/9	1/11
4½ in.	4½ × 3½ in.	½-pl. Roll Film Sanderson	3/0	1/6
5 in.	5 × 4 in.	5 × 4 Roll Film Sanderson		
		No. 5 B Al Vista		
		No. 5 D Al Vista	3/9	1/11
		Ensign Model D		
7 in.	7 × 5 in.	½-pl. Roll Film Sanderson		
		No. 7 E Al Vista	6/8	3/4

N.B.—In ordering it is only necessary to quote the Height of Spool given in the first column of the above table.

88 & 89, High Holborn, London, W.C.

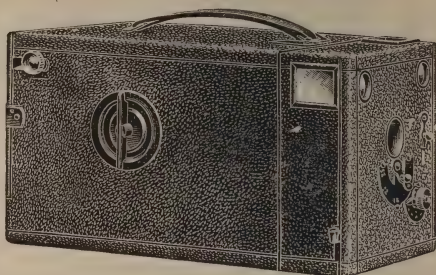
The . . .

DALO

(E. D. PARTLETT'S PATENTS
IN GREAT BRITAIN AND U.S.A.)

**THE
DAYLIGHT
LOADING
CAMERA**

*for
Flat Cut
Films.*



For the **first time** in the history of Photography the **Principle of Daylight Loading** is applied to **Stiff Flat Cut Films**, and marks an advance worthy of the dawn of the 20th Century.

The "**DALO**" system combines all the special advantages claimed for both Glass Plates and the Roll Film.

It possesses the portability of the Roll Film, and the ease of development of the Glass Plate.

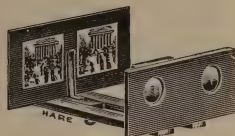
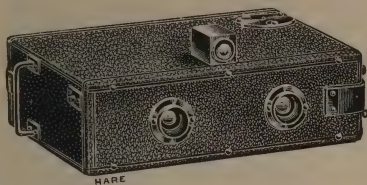
In the "**DALO**" **Camera** the already exposed Films can, in a few moments, be removed from the instrument in daylight, without fear of fogging those still remaining on the spool.

FULL PARTICULARS POST-FREE.

GEORGE HOUGHTON & SON,

The . . .

“Smyth” Stereo Hand Camera.



The “Smyth” Stereo Hand Camera has been designed to place before the amateur as compact a **Stereoscopic** instrument as possible, yet capable of turning out work of a very high order.

Small in bulk, being only two inches in thickness, and weighing loaded but 24 ounces, it is nevertheless a thoroughly practical instrument. Neat and elegant in appearance, it appeals particularly to the pedestrian and cyclist.

The facility with which photographs in relief can be executed by this instrument should recommend it particularly to those who have been deterred by real or fancied difficulties from practising stereoscopic photography.

Single pictures may also be taken by covering up one of the lenses with cap during exposure.

A Special Enlarging Apparatus can be obtained at a small increased cost, and the negatives may be enlarged to make lantern slides, enlarged positives (transparencies), or enlargements on Bromide Paper.

“Smyth’s” Stereo Hand Camera, for pictures

$1\frac{1}{8} \times 1\frac{1}{8}$ inches, complete with 12 Sheaths, for 12

Single or 6 Stereoscopic Pictures, and Stereoscope

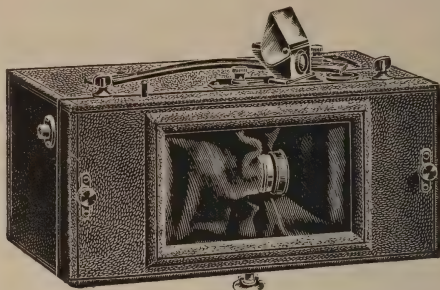
for viewing same **£2 2 0**

Enlarger, for making Lantern Slides, Enlarged Negatives, etc., **15/0**

88 & 89, High Holborn, London, W.C.

THE "AL-VISTA" Panoramic Camera.

FOR DAYLIGHT-LOADING ROLL FILMS.



POINTS ABOUT THE "AL-VISTA."

Long or Short
Pictures in one
Camera.

Time Exposures.

Speed Regulator to
Shutter.

The Picture three
times wider than
it is high.

Loaded in Daylight.



The "AL-VISTA" is a Panoramic Camera that enables the operator to take in a scope of about 180°, and is the best camera for making views of fine scenery, such as broad landscapes, intersections of wide streets, field sports, yacht races and marine views, etc. The swinging lens does it. You touch the button and in an instant it records everything within its sweep. It can be *loaded* and *unloaded* in *broad daylight*. Is simplicity in itself; a child can operate it. It has, in addition, a new patent attachment for making negatives of different lengths, thus combining "*many cameras in one* and but *one* in itself." It is made for Snap-Shot and Time exposures of varying speeds, thus ensuring good pictures in various degrees of light.

These splendid cameras can now be supplied fitted with "*Goerz*" Double Anastigmat Lenses, *Series III.*, working at an aperture of $f/6.8$, thus making them the most perfect Panoramic Cameras it is possible to obtain.

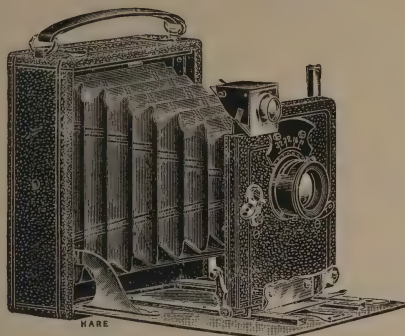
They are covered with the finest black morocco leather, with nickel fittings, are light and compact, and yet make large pictures.

No. 3B. —For pictures $3\frac{1}{2} \times 4\frac{1}{2}$, or $3\frac{1}{2} \times 9$ in. Size of Camera, $8\frac{3}{4} \times 5\frac{1}{2} \times 4\frac{3}{4}$ in. With Rapid Rectilinear Lens	£ s. d.
Ditto, with "Goerz" Double Anastigmat Lens, Series III.	4 4 0
Solid Black Leather Case	11 0 0
No. 4B. —For pictures 4×4 , 4×6 , 4×8 , 4×10 and 4×12 in. Size of Camera, $10\frac{3}{4} \times 6\frac{1}{2} \times 5\frac{1}{2}$ in. With Rapid Rectilinear Lens	0 11 6
Ditto, with "Goerz" Double Anastigmat Lens, Series III.	5 5 0
Solid Black Leather Case	12 10 0
No. 5B. —For pictures 5×4 , 5×6 , 5×8 , 5×10 , or 5×12 in. Size of Camera, $10\frac{3}{4} \times 6\frac{1}{2} \times 6$ in. With Rapid Rectilinear Lens	0 13 6
Ditto, with "Goerz" Double Anastigmat Lens, Series III.	6 6 0
Solid Black Leather Case	13 10 0
No. 5D. —For pictures 5×6 or 5×8 , 5×10 , 5×14 , and 5×16 in. Size of Camera, $13 \times 6\frac{1}{2} \times 7\frac{3}{4}$ in. With Rapid Rectilinear Lens	0 15 6
Ditto, with "Goerz" Double Anastigmat Lens, Series III.	10 10 0
Solid Black Leather Case	18 15 0
No. 7D. —For pictures 7×15 or $7 \times 7\frac{1}{2}$. With Rapid Rectilinear Lens	1 0 0
Solid Black Case	15 15 0
No. 7E. —For pictures 7×21 or $7 \times 10\frac{1}{2}$. Fitted with Special Lens	1 10 0
Solid Black Leather Case	21 0 0
No. 4G. —For pictures 5×4 and 10×4 in. Size of Camera, $9\frac{3}{4} \times 6 \times 5$ in. With Rapid Rectilinear Lens	1 10 0
Solid Black Leather Case	3 3 0
	0 11 6

GEORGE HOUGHTON & SON,

The . . .

"Plato" Folding Pocket Hand Camera.



FOR PICTURES

 $4\frac{1}{4} \times 3\frac{1}{4}$.

THE "PLATO" FOLDING POCKET HAND CAMERA

is designed on the lines of the popular American type of Camera, but **is so compact when closed**, having no projections, that it is easily accommodated in the coat pocket.

The Camera may be opened ready for use in an instant, as the **PATENT INFINITY CATCH** automatically fixes the front, when drawn out, at the correct focus for distance—this position being that required for the majority of snap-shot exposures—thus avoiding the necessity of careful adjustment and consequent loss of time.

A **Focussing Scale** for nearer objects is provided, and the Lens Board can be clamped firmly in any desired position.

A **Focussing Screen with Hood** is also fitted for use when the Camera is used upon a tripod. The exterior of the Camera is covered in **real leather** of hard surface and great durability, with nickel fittings and handle for carrying.

A good quality **Rapid Rectilinear Lens**, a **reversible Brilliant View Finder**, a **Direct Vision View Finder** with Sighter, an **Ever-set Shutter**, giving Time and Instantaneous Exposures, and **three Single Metal Plate Holders in Case** complete this excellent outfit.

"PLATO" Folding Pocket Hand Camera,
complete with 3 single Plate Holders for
Plates $4\frac{1}{4} \times 3\frac{1}{4}$ **£2 7 6**

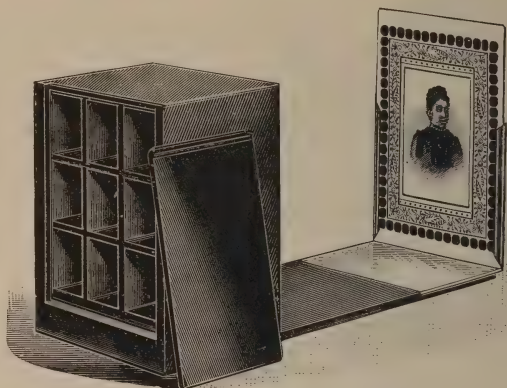
Extra Single Slides..... each 1/6

Envelope Case to carry 3 Single Slides 1/0

..... 6 1/6

88 & 89, High Holborn, London, W.C.

The 'Holborn' Stamp Camera.



With the "Holborn" Stamp Camera nine perfect **Stamp Photographs** can be produced upon a **quarter-plate** Negative by copying from any C.-de-V., Cabinet, $\frac{1}{4}$ -plate or other small-size Photograph, or direct Photographs can be taken if desired.

The Camera, which is well made throughout and neatly covered in black cloth, is fitted with **nine Lenses**, and the results obtained are perfect in every way, and will give every satisfaction.

It is fitted with a Sliding Holder, in which grooves are provided to place the Photographs to be copied, and the price includes a well-finished Dark Slide and C.-de-V. and Cabinet Masks to place in front of the Photograph to give the necessary Stamp effect.

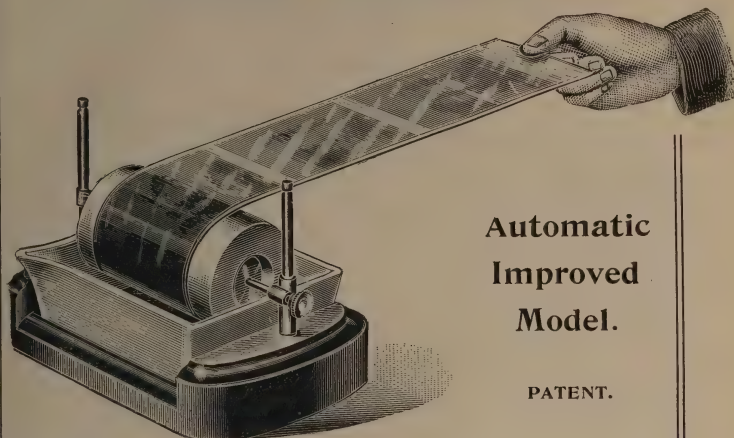
Holborn Stamp Camera, complete in box, 12/6.

Price List of Special **Stamp Mounts** for Photos produced in this Camera, Post-free.

GEORGE HOUGHTON & SON,

The "WYNDHAM"

FILM DEVELOPING MACHINE.



**Automatic
Improved
Model.**

PATENT.

This Apparatus is now supplied in a greatly improved form, doing away entirely with the Rubber Bands supplied with the original model.

The tension is now obtained by means of a spring inside the drum.

The "Wyndham" Machine enables even the novice to develop, fix and wash Rollable Films with an ease, rapidity and perfection that must be experienced to be fully appreciated.

It is not too much to say that after a trial of this machine the user will never employ any other method of developing Rollable Films.

The principle of this Apparatus consists in winding and unwinding the Film upon a Drum during development, etc., the tension for revolving the Drum being obtained by means of a coil spring being fitted inside the Drum itself.

PRICES OF IMPROVED MODEL.

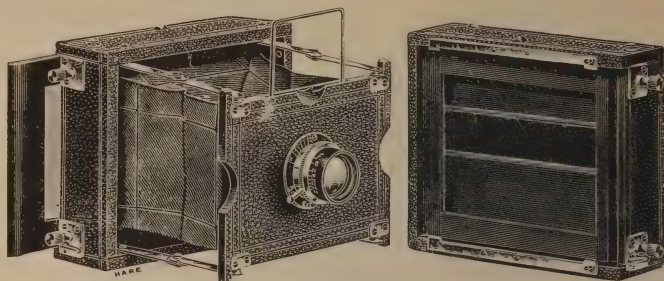
Complete in Box with Two Dishes.

- | | |
|--|-------------|
| No. 1.—With 5-inch Drum, takes any length of Film and any width up to 5 inches | 10/6 |
| No. 2.—With 7-inch Drum, takes any length of Film and any width up to 7 inches | 13/6 |

88 & 89, High Holborn, London, W.C.

THE . . .

"Essemm" Focal Plane Hand Camera.

FOR PLATES $4\frac{1}{4} \times 3\frac{1}{4}$.

The introduction of this Hand Camera at the extremely moderate price of £3 10 0, complete with R.R. Lens, Focal Plane Shutter and three Slides, places within the reach of all a perfect and reliable Focal Plane Hand Camera. Workers who already have Hand Cameras of other types with Shutters not sufficiently rapid for such instantaneous subjects as that required for securing pictures of athletic sports, such as cycling, running, jumping, etc., can now become possessors of an instrument capable of this work at a comparatively small cost.

The Camera folds up very compactly, measuring only $7 \times 5\frac{1}{4} \times 2\frac{3}{4}$.

Price, complete with three Double Slides for Plates $4\frac{1}{4} \times 3\frac{1}{4}$	£3 10 0
Extra Slides.....	each 5/0
Solid Leather Case for Camera and three Slides ..	„ 7/6

GEO. HOUGHTON & SON,

88 & 89, High Holborn,

 LONDON, W.C.

Telegrams—

"BROMIDE, LONDON."

Telephone—

322 HOLBORN.

ESTABLISHED 1849.

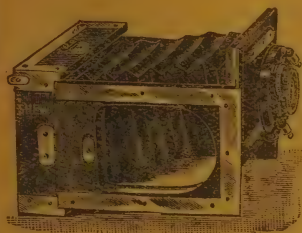
GOLD MEDAL AND
HIGHEST AWARDS
FOR HAND
CAMERAS.



SHEW CAMERAS

Are the only Cameras of English Design and
Manufacture which have withstood the keen competi-
tion of the Past Seventeen Years.

The Aluminium Xit.



New Pocket Series.

A $\frac{1}{4}$ -Plate Camera carried in
a Breast Pocket.

Opened in an instant and
rigid as a box.

Rising Front.

Focussing.

For Hand or Stand.

		$4\frac{1}{2} \times 3\frac{1}{4}$	5×4
With Aldis Lens F 6	... ..	£5 17 6	£8 2 6
With Busch Lens F 6	... ..	£6 6 0	£7 15 0

See New List free on application.

The XIT GOERZ.

This series of our Aluminium Xit we have specially designed for the celebrated Goerz Double Anastigmat Lenses in their Aluminium Sector Shutter, the lenses specially mounted in this shutter effecting a considerable economy of weight, the camera folding over the lens and shutter mechanism protecting it as if in a box.

An Ideal Half-plate Set. Instantly erected. Perfectly rigid for hand or stand. Weighing only three pounds. For simplicity, lightness and range of subjects for which it can be used this camera is unequalled.

The camera has extreme rise to the front, horizontal and vertical. The lens, Goerz Universal Double Anastigmat for instantaneous work, landscape, architecture, or portraiture, of original Berlin make, with diaphragms engraved with f values, in Shew lever focussing flange scaled for hand exposures, and fine focussing adjustment for stand work; the Goerz New Sector Shutter for time and instantaneous exposures, working without any shock or jerk, and giving accurately adjusted speeds ranging from half-a-second to $\frac{1}{1000}$ th and for time.

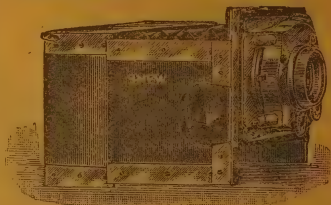
The speeds of this shutter are absolutely reliable.

The outfit, consisting of camera, three aluminium-bound Xit double backs, or the daylight changing dark slide with 6 envelopes, lens, shutter, and Shew's new brilliant Finder.

For pictures	$4\frac{1}{2} \times 3\frac{1}{4}$	..	5×4	..	$6\frac{1}{2} \times 4\frac{1}{2}$
Weighing complete	$1\frac{3}{4}$ lbs.	..	$2\frac{1}{4}$ lbs.	..	3 lbs.
Dimensions closed	$5\frac{1}{2} \times 3\frac{3}{4} \times 2$	..	$6\frac{1}{2} \times 4\frac{1}{2} \times 2$	..	$8 \times 5\frac{1}{2} \times 2\frac{1}{2}$

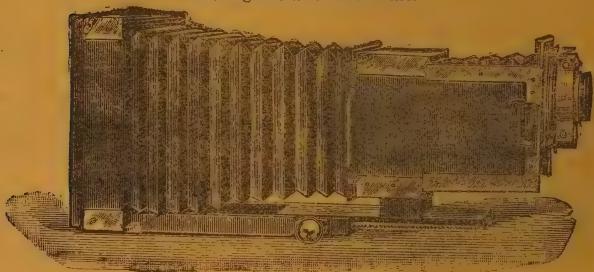
In best leather carrying case, with lock, handle, and sling.

The Set complete, for pictures	$4\frac{1}{2} \times 3\frac{1}{4}$	5×4	$6\frac{1}{2} \times 4\frac{1}{2}$
Fitted with the New Series Anastigmat			
LB. $f/4.8$	£15 10 0	£18 17 6	—
or Fitted with the Series III. $f/6.8$ lens	14 10 0	16 7 6	£19 17 6
Extra Double Backs, aluminium bound			
and fitted, per set of three	1 5 0	1 10 0	1 15 0



The XIT ADAPTER.

Folding flat when not in use.

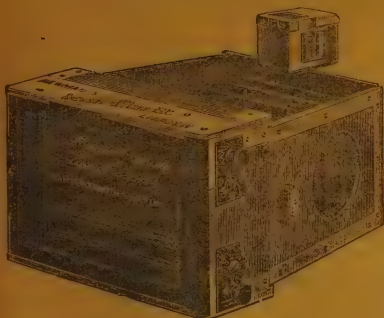


A Folding Extension Back for use in conjunction with the Xit Camera, forming a complete Racking Camera for pictures of larger dimensions, using the Xit Lens combined, with a smaller stop to cover the plate of the increased size as a Wide-Angle Lens, or single combination of the anastigmat lenses for Copying, Telephoto, or Landscape work.

The Xit Adapter as above, with focussing screen and one Xit pattern double back.			
For pictures.	£	s.	d.
Fitted to the $\frac{1}{2}$ -plate Xit	$6\frac{1}{2} \times 4\frac{1}{2}$	..	2 10 0
Fitted to 5×4 or $6\frac{1}{2} \times 4\frac{1}{2}$	$8\frac{1}{2} \times 6\frac{1}{2}$	..	3 3 0
Extra backs, each.			
		..	£0 12 6
		..	0 17 6

Shew Cameras.

The Focal-Plane Xit.



THIS New Pattern Focal-Plane Camera has the Anschütz Shutter, constructed in the body frame, reducing the increase of dimensions to a minimum; a special frame of aluminium containing the mechanism of the shutter, being of the same width as the Camera, which retains the **perfect rigidity** of our Pocket Series, and is instantly brought into action.

Rising Front, Horizontal and Vertical.

For Pictures. Dimensions. Weight.
 $4\frac{1}{2} \times 3\frac{1}{2}$... $5\frac{1}{2} \times 4\frac{1}{2} \times 2\frac{1}{2}$... 1 lb.
 5×4 ... $6\frac{1}{2} \times 5 \times 2\frac{1}{2}$... 1 lb. 2 oz.
 $6\frac{1}{2} \times 4\frac{1}{2}$... $8 \times 6 \times 2\frac{1}{2}$... 1 lb. 10 oz.

The Focal-Plane Xit

is suited for lenses of varied foci, and our lever focussing flange is so constructed

as to admit of other lens within the same flange. We can, if desired, arrange the camera to give a range of focus as follows:—

$\frac{1}{2}$ plate, 4 to 7 inches. 5×4 , $4\frac{1}{2}$ to 8 inches.
 $\frac{1}{2}$ plate, 6 to 10 inches.

A wide angle or short focus lens can therefore be added as required.

The Focal-Plane Xit Outfit, consisting of the camera, three Xit double backs for glass plates or cut films of any make, focussing screen and Shew lever focussing flange fitted to the lens, scaled for infinity, and for nearer work at fixed focus in yards; Shew's new model Brilliant finder or the direct vision, as preferred; Shew's flush level fittings for tripod, and solid leather case, with lenses fitted as follows:—



The Goerz Anastigmat, New Series I.B., 1902, F 4.8
 The Goerz Anastigmat, New Series I.C., F 6.3
 The Dallmeyer Stigmatic, No. 2, F 6
 The Beck-Steinhil Orthostigmat, Series I., F 6.3
 Zeiss Unar, F 5, backs, D ch slide for 6, or roll holder for 12 films
 The Camera only, three Xit double backs, focussing screen, and tripod fittings, supplied without lens or other accessories, for
 Adjusting purchasers' lenses

Shew Lever Focussing Flange in aluminium with cross front for vertical rise—Inside diameter of flange

$4\frac{1}{2} \times 3\frac{1}{2}$	5×4	$6\frac{1}{2} \times 4\frac{1}{2}$
£ s. d.	£ s. d.	£ s. d.
14 15 0	17 5 0	19 15 0
13 2 6	14 10 0	18 17 6
14 17 6	16 17 6	20 7 6
14 7 6	16 7 6	19 15 0
14 17 6	16 17 0	21 5 0
6 15 0	7 5 0	8 15 0
...	from 7s. 6d. to 10s.	...
$1\frac{1}{2}$ ins. ...	$1\frac{1}{2}$ ins. ...	2 ins. ...
25s.	32s. 6d.	37s. 6d.
		42s.

SHEW CAMERAS.

New Popular Series.

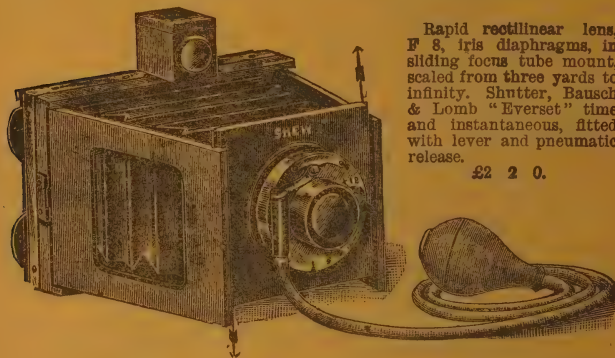
THE GUINEA XIT. 1903.

New Lens, Focussing with Improved Shutter with Adjustable Speeds.

THREE DOUBLE BACKS FOR SIX PLATES OR CUT FILMS OF ANY MAKE, $4\frac{1}{2} \times 8\frac{1}{2}$.

Hand or Stand, Rising Front, Focussing Screen and Tripod Fittings, Weighing One Pound.

THE TWO-GUINEA XIT.



Rapid rectilinear lens, F 8, iris diaphragms, in sliding focus tube mount, scaled from three yards to infinity. Shutter, Bausch & Lomb "Everset" time and instantaneous, fitted with lever and pneumatic release.

£2 2 0.

Carried in a breast pocket. £2 2 0.

THE POPULAR 2a.

The XIT 2a Camera, of superior manufacture, mahogany polished, with leather bellows, rising front, and tripod fittings, is now fitted with Bausch Detective Aplanat Lens, F 6, in unicum shutter, Shew lever focussing flange, three superior double backs, brilliant finder and case.

DIMENSIONS:

$5\frac{1}{2} \times 3\frac{1}{4} \times 1\frac{1}{2}$ £4 10 0

THE POPULAR 2b.

The same composition, but fitted with the Aldis Lens in unicum shutter.

£4 4 0



Shew's Focal Plane "Reflector."

For Instantaneous Exposures from 1-25th to 1-1000th of a second, and for Time.



**RISING
FRONT.**

**REVERSING
BACK.**

Fitted with the Goerz-Anschutz Focal Plane Shutter with adjustable slit, speed regulated from outside.

Reversible back for pictures horizontal or vertical without turning the camera.

Full size view finder, with revolving diaphragm.

Folding hood, removable to permit of easy access to the mirror screen.

Rack and pinion focussing adjustment.

Shew flush level.

Tripod bush for stand exposures.

Shoulder strap and carrying handle.

Long extension for lenses of various focal length, as follows :—

For Pictures—			Back Focus of Lens—		
$4\frac{1}{2} \times 3\frac{1}{4}$	..	..	5	to 13 ins.	
5×4	..	..	6	to 14	ins.
$6\frac{1}{2} \times 4\frac{1}{2}$	..	..	8	to 17 ins.	
Dimensions of Reflector—			Weight—		
$4\frac{1}{2} \times 3\frac{1}{4}$	..	$8\frac{1}{2} \times 5\frac{1}{2} \times 6\frac{1}{2}$	..	4 lbs.	
5×4	..	$9\frac{1}{2} \times 6\frac{1}{2} \times 7\frac{1}{2}$	..	5	lbs.
$6\frac{1}{2} \times 4\frac{1}{2}$	..	$12 \times 8 \times 9\frac{1}{2}$	..	7	lbs.

Shew's Focal Plane "Reflector."

The camera only, fitted with three of our Xit pattern double backs, aluminium bound, for cut films or glass plates, or the daylight changing dark slide with six envelopes £9 9 0 £11 11 0 £15 15 0

ACCESSORIES to the above.

Double Backs, extra, per set of three 1 5 0 1 10 0 1 15 0
Daylight Dark Slide Envelopes, per dozen 0 11 6 0 14 6 0 17 6
Daylight Cartridge Roll Film Holder fitted interchangeable and to the same register as dark slides 1 7 6 1 7 6 1 17 6
Waterproof Canvas Case, Collapsible, with web shoulder strap for camera and three double backs, daylight dark slide or roll film holder 0 15 6 0 17 6 1 1 0

LENSES FOR THE FOCAL PLANE "REFLECTOR."

The New Series Goerz Double Anastigmat, original Berlin manufacture, Equiv. with Diaphragms engraved with F Focus.	£	s.	d.	Focus.	£	s.	d.	Focus.	£	s.	d.	Focus.	£	s.	d.
values, Series I B, F 4.8	6	10	0	6 in.	7	10	0	8½ in.	9	5	0	8½ in.	9	5	0
Series III, F 6.8	6	5	0	7 in.	7	5	0	8½ in.	8	5	0	8½ in.	8	5	0
Series I C, F 6.3	4	10	0	7 in.	5	10	0	8½ in.	7	0	0	8½ in.	7	0	0
The Zeiss Unar, F	6	0	0	8½ in.	9	10	0	10 in.	13	0	0	10 in.	13	0	0
The Zeiss Convertible, F 6.3	9	15	0	8 in.	11	15	0	9½ in.	15	5	0	9½ in.	15	5	0
The Dallmeyer Stigmatic, F 6	6	15	0	7.6 in.	8	2	6	9 in.	10	10	0	9 in.	10	10	0
The Beck-Steinheil Orthostigmat, F 6.3 6 in.	6	0	0	7½ in.	7	5	0	8½ in.	8	10	0	8½ in.	8	10	0

The Focal Plane "Reflector."



Simple model for lenses from 5 to 7 in. back focus, made in 4¼×3¼ size only, complete with three double backs or daylight changing dark slide as above,

£8 8 0

Any of the above-named lenses fitted, if purchased of us, without charge.
 Fitting purchasers' own lenses from 7/6 to 10/-.

Shew Cameras.

The PRESS

CAMERAS.

HAND AND STAND. FOR PLATES AND FILMS.

MADE IN HALF-PLATE ($6\frac{1}{4} \times 4\frac{3}{4}$) SIZE ONLY.

No. 1.—A strongly-bound FOCAL PLANE CAMERA, with extending sides, to carry lenses of various foci from 6 to 14 inches, perfectly rigid at its full extension, and forming when closed a neat and compact box measuring $8\frac{1}{2} \times 6\frac{1}{2}$, the back being provided with hinged door protecting the slide.

Many of these cameras are now in use by some of the best Press photographers, and we can recommend this pattern as one which has been well tested by hard wear in the hands of users for many years.

No. 2.—The PRESS REFLECTOR, of landscape form, special construction, giving triple extension by means of folding sides, supporting the front with perfect rigidity, and closing for use with short focus lenses, the camera, with rack and pinion adjustment, having a focal range of $6\frac{1}{2}$ in. to 19 in.

DIMENSIONS CLOSED, $8\frac{3}{4} \times 8 \times 7\frac{1}{2}$ in.

This Camera, having Focal Plane Shutter, Reflector, and Reversing Hood, &c., is made to withstand rough usage, and the advantage of seeing the exact view shewn by the lens will be found a boon to the worker in the field.

The Camera supplied with Three Double Backs or with Daylight Changing Dark Slide or Roll Film Holder, as selected.

No. 1.—£10 10 0.

No. 2.—£13 13 0.

Shew's Popular Reflector.



Focussing up to the moment of exposure.
Adjustable Speeds to the Shutter.
Full-sized Finder, and Freedom from
Complications.

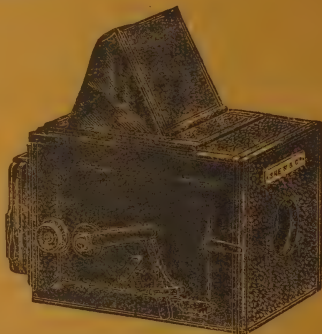
The increased popularity of this camera has enabled us to manufacture it in the 5×4 size, with improved hood, without increase in price.

A convenience much appreciated in this model is the

Reversing Back

FOR

Horizontal or Vertical Pictures.



The Camera, fitted with three Xit pattern
Double Backs for Glass Plates or Cut Film,
and

	4½ × 3¼	5 × 4
The New Aldis Anastigmat Lens F 6 ...	£6 12 6	£8 10 0
The Busch Aplanat Lens F 6 ...	£5 10 0	£7 10 0
Rapid Rectilinear Lens F 8 ...	£4 4 0	£6 6 0

J. F. SHEW & CO.

INVENTORS, MANUFACTURERS, AND PATENTEES OF

**Specialities in
Photographic Apparatus,**

AND DEALERS IN EVERY DESCRIPTION OF

**Photographic Materials
and Accessories,**

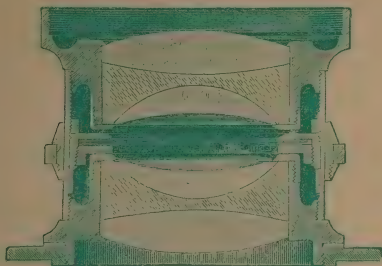
Newman Street (FOUR DOORS FROM OXFORD STREET), London, W.

(Telegrams: 'Developer, London.')

C. P. GOERZ,

OPTICAL WORKS,

Nos. 1 to 6 Holborn Circus, London, E.C.



Telegrams :
"PHOTOPSIA,
LONDON."

Telephone :
1696
HOLBORN.

Goerz Double Anastigmats

are unquestionably the best Photographic Lenses, and have been pronounced by authorities the very acme of perfection.

The Double Anastigmats are unrivalled for their Perfect Corrections, freedom from Astigmatism,

**Flatness of Field,
Exquisite Definition, and
Extreme Covering Power.**

The different Series (see following pages) provide for every requirement of the Photographer.

For hand camera work the lenses of shorter focus can be supplied fitted with the Goerz Sector Shutter (see page 402) or Bausch & Lomb Shutters.

The Series III., F/6.8 and F/7.7 will be found sufficiently rapid for instantaneous and other photography, and having greater covering power than either the Series I B or I C, can be used as a wide-angle lens on a plate larger than that it is listed to cover. It can therefore be recommended as the best **universal** lens either for the professional or amateur. The Series I B and I C at open aperture cover the plates for which they are listed, and the rapidity of the former renders it the lens *par excellence* for extremely rapid hand camera exposures, or for studio use. The definition given by the Series I C is not inferior; for those desiring a high-class Anastigmat at a moderate cost, it can be recommended.

Goerz Double Anastigmat

SERIES III.,

F 6.8 up to No. 6. Higher Numbers F 7.7.

The finest Universal Lens in spite of all later introductions; is highly suitable for Portraits, Groups, Instantaneous Work, and Architecture. The Double Anastigmat Series III. permits the use of the largest stop without diminishing the sharpness of the image at the extreme margins of the plate up to an angle of 70°. By the use of a smaller stop an angle of 90° is obtained. Definition, brilliancy, and flatness of field are uniform all over the picture.

Each Goerz Double Anastigmat, Series III., supplies:—

1. **A RAPID LENS** for general purposes—Portraiture, Landscape, Architecture, Enlargements, etc., working at **full aperture** with extreme sharpness to the edges of the plate for which it is constructed.
2. **A WIDE ANGLE LENS** for Interiors and all views at short distances, sharply covering a much larger plate when smaller apertures are employed.
3. **A LONG-FOCUS LENS** for distant objects, when the back combination alone is used.

No.	Equiva- lent Focus	Size of Plates sharply covered		Code Word.	Price with Iris Diaphragm.			Price in Focussing Mount.*		
	in.	Full Aperture in.	with smaller stops. in.		£	s.	d.	£	s.	d.
0000	1 $\frac{5}{8}$	1 $\frac{5}{8}$ × 1 $\frac{5}{8}$	2 × 2 $\frac{3}{4}$	Capo	4	15	0	—		
000	2 $\frac{3}{8}$	2 $\frac{3}{8}$ × 2 $\frac{3}{8}$	2 $\frac{3}{4}$ × 3 $\frac{1}{2}$	Cardiff	4	15	0	—		
00	3 $\frac{1}{2}$	3 $\frac{1}{2}$ × 3 $\frac{1}{4}$	4 × 5	Cadiz	5	0	0	5	15	0
0	4 $\frac{3}{4}$	3 $\frac{1}{2}$ × 4 $\frac{1}{4}$	4 $\frac{1}{2}$ × 6 $\frac{1}{2}$	Cæsar	5	5	0	6	0	0
1	6	4 × 5	5 × 8	Calderon	6	5	0	7	5	0
2	7	4 $\frac{1}{2}$ × 6 $\frac{1}{2}$	7 × 9	Calla	7	5	0	8	5	0
3	8 $\frac{1}{4}$	5 × 8	8 × 10	Calvin	8	15	0	9	15	0
4	9 $\frac{1}{4}$	6 $\frac{1}{2}$ × 8 $\frac{1}{2}$	10 × 12	Camerun	10	10	0	11	15	0
5	10 $\frac{3}{4}$	7 × 9	12 × 15	Camillus	12	15	0	—		
6	12	8 × 10	16 × 18	Canada	15	5	0	—		
7	14	10 × 12	18 × 22	Capet	19	15	0	—		
7a	16 $\frac{1}{2}$	11 × 14	21 × 25	Caviar	26	0	0	—		
8	19	12 × 15	22 × 25	Carlos	31	0	0	—		
9	24	16 × 18	24 × 30	Census	46	0	0	—		
10	30	18 × 22	28 × 36	City	76	5	0	—		
11	35	22 × 25	34 × 44	Columbia	151	5	0	—		

* When ordering by telegram, add "focussing" to code word.

The Lenses can be accurately paired for Stereoscopic work at an extra charge of 8/-.

NEW SERIES Goerz Double Anastigmat.

Series I B. F/4.5 to 5.5.

No.	Equivalent Focus.	Plate Covered		Code Word.	Price with Iris Diaphragm.	Price in Focussing Mount.
		at full aperture. in.	with smaller stops. in.			
000	$2\frac{3}{8}$	$2\frac{1}{4} \times 1\frac{1}{2}$	$2\frac{3}{4} \times 2$	Baal	4 15 0	5 10 0
00	$3\frac{1}{2}$	$3\frac{1}{2} \times 2\frac{1}{2}$	$4 \times 2\frac{3}{4}$	Babel	5 5 0	6 0 0
0	$4\frac{3}{4}$	$4\frac{1}{2} \times 3\frac{1}{4}$	5×4	Bacca	5 10 0	6 5 0
1	6	5×4	$6\frac{1}{2} \times 4\frac{3}{4}$	Babuin	6 10 0	7 5 0
2	7	$6\frac{1}{2} \times 4\frac{3}{4}$	$8 \times 5\frac{1}{2}$	Bacchus	7 10 0	8 5 0
3	$8\frac{1}{4}$	7×5	$8\frac{1}{2} \times 6\frac{1}{2}$	Baco	9 5 0	10 5 0
4	$9\frac{1}{4}$	$8 \times 5\frac{1}{2}$	9×7	Bairam	12 10 0	13 10 0
5	$10\frac{3}{4}$	$8\frac{1}{2} \times 6\frac{1}{2}$	10×8	Bagdad	15 0 0	—
6	12	9×7	12×10	Bagger	17 10 0	—
7	14	10×8	14×11	Bagno	22 10 0	—
7a	$16\frac{1}{2}$	12×10	16×14	Bacillus	28 15 0	—
8	19	15×12	20×16	Bakul	33 15 0	—

This Series of Lenses is specially adapted for instantaneous work of any kind and for the shortest exposures ($\frac{1}{1000}$ of a second and less), Portraiture in the Studio or ordinary rooms, lantern and Cinematograph Projection Enlargements, Reproductions, Three Colour Work, Telephotography, as well as for Landscapes and Architecture, and in all cases where an extremely wide angle is not required.

The apertures of the different lenses are as follows—No. 000, F/4.5; No. 00 to No. 2, F/4.8; No. 3 to No. 5, F/5; No. 6 to No. 8, F/5.5.

The back combination can be used with a small stop, and has about double the focus of the complete lens.

For Stereoscopic work the Lenses can be accurately paired at an extra charge of 8s.

Goerz Double Anastigmats. Series I C F6/3.

No.	Equivalent Focus.	Plate Covered		Code Word.	Price with Iris Diaphragm.	Price in Focussing Mount.
		at full aperture. in.	with smaller stops. in.			
00	$3\frac{1}{2}$	$3\frac{1}{2} \times 2\frac{1}{2}$	$4 \times 2\frac{3}{4}$	Braga	3 10 0	4 5 0
0	$4\frac{3}{4}$	$4\frac{1}{2} \times 3\frac{1}{4}$	5×4	Brom	4 0 0	4 15 0
1	6	5×4	$6\frac{1}{2} \times 4\frac{3}{4}$	Break	4 10 0	5 5 0
2	7	$6\frac{1}{2} \times 4\frac{3}{4}$	$8 \times 5\frac{1}{2}$	Blak	5 10 0	6 5 0
3	$8\frac{1}{4}$	7×5	$8\frac{1}{2} \times 6\frac{1}{2}$	Buffo	7 0 0	8 0 0
4	$9\frac{1}{4}$	$8 \times 5\frac{1}{2}$	9×7	Bull	8 10 0	9 10 0
5	$10\frac{3}{4}$	$8\frac{1}{2} \times 6\frac{1}{2}$	10×8	Burgi	10 0 0	—

The Lenses of this Series are of similar construction to the foregoing and as perfectly corrected. The back combination can be used with a small stop, and has about double the focus of the complete lens.

For Stereoscopic views the Lenses can be delivered accurately paired at an extra charge of 8s.

* When ordering by telegram, add "focussing" to code word.

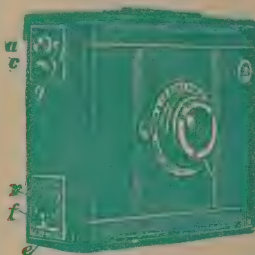
The . . . Goerz-Anschutz Folding Camera.

This Camera is extremely compact and is opened for use by simply pulling the front out until the stays catch. The lens is focussed for infinity, but by means of a lever working on the lens itself, and a carefully adjusted scale, nearer objects can be accurately focussed; a ground glass screen is also provided. The **focal plane shutter** (the invention of Herr Ottomar Anschütz whose photographs of objects in rapid motion are so well known) allows of exposures being made varying from $\frac{1}{25}$ th to $\frac{1}{1000}$ th of second, and for all instantaneous work is a necessity. The speeds are varied by increasing or decreasing the tension on the spring, or by altering the width of the slit by sliding a bar along—either operation is simple and the work of a moment. Time exposures may be obtained by using the lens cap, or, if desired, a special detachable time shutter, working in front of the lens can be fitted. The camera is fitted with a rising and sliding front and a sighting arrangement. It can be fixed to a tripod stand. The camera is so simple and efficient as to ensure excellent results, and a few specimens of its work are to be found in a pamphlet to be obtained free on application.

Extreme lightness.

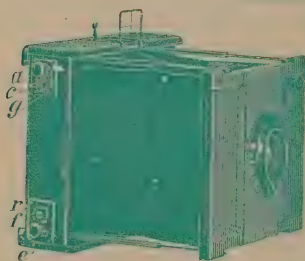
Extreme smallness.

Extreme portability.

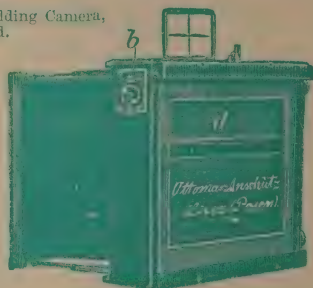


Goerz-Anschutz Folding Camera,
closed.

Focal-plane shutter
with adjustable slit,
giving up to $\frac{1}{1000}$ sec.
exposure.



Goerz-Anschutz Folding Camera
ready for use, Front view.



Goerz-Anschutz Folding Camera
ready for use, Back view.

As to the choice of lenses the reader is referred to page 395.

NOTE. The Goerz-Anschutz Focal Plane Shutter can also be fitted to other Cameras. Prices will be sent on receipt of dimensions of the required Shutter, which has to be built to suit the Camera.

Sizes, Weights, & Prices of the Goerz Anschutz Folding Camera.

SIZES OF PLATES.	6½ × 9 c.m. about 2½ × 3½ in.		3½ × 4½ in. (or 9 × 12 c.m.)		4 × 5 in.		4½ × 6½ in. (and 12 × 16½ c.m.) or 13 × 18 c.m.)		Stereoscopic Size. 3½ × 6½ or 9 × 18 c.m.		6½ × 8½ in. (or 18 × 24 c.m.)	
	2½ × 4½ × 5½ in.		2½ × 5½ × 6½ in.		2½ × 6 × 7½ in.		2½ × 7½ × 9 in.		3½ × 5½ × 9½		4 × 9½ × 12½ in.	
WEIGHT OF CAMERA & LENS (about)	15 oz.		1 lb. 8 oz.		1 lb. 15 oz.		3 lb. 1 oz.		2 lb. 11 oz.		6 lb. 10 oz.	
Goerz-Anschutz Folding Camera with focusing screen, without lens	£ s. d. 3 15 0	£ s. d. 4 3 0	£ s. d. 4 3 0	£ s. d. 4 3 0	£ s. d. 4 3 0	£ s. d. 4 3 0	£ s. d. 5 9 0	£ s. d. 5 9 0	£ s. d. 5 6 0	£ s. d. 5 6 0	£ s. d. 8 13 0	£ s. d. 8 13 0
Double Anastigmat, Series III, f: 6.8 with focusing screen	No. 00 5 15 0	No. 0 6 0 0	No. 0 6 0 0	No. 0 6 0 0	No. 1 7 5 0	No. 0 2 8 5 0	No. 0 2 8 5 0	No. 0 12 8 0	No. 0 12 8 0	No. 0 12 8 0	No. 0 12 8 0	No. 0 12 8 0
6 Double Dark Slides with aluminium mountings	£d 10 3 0 0	£d 12/- 3 12 0	£d 12/- 3 12 0	£d 12/- 3 12 0	£d 12/- 3 12 0	£d 12/- 3 12 0	£d 12/- 3 12 0	£d 12/- 3 12 0	£d 12/- 3 12 0	£d 12/- 3 12 0	£d 12/- 3 12 0	£d 12/- 3 12 0
Leather Case for camera with 6 dark slides (or with changing box)	0 12 0	0 15 0	0 15 0	0 15 0	0 15 0	0 15 0	0 15 0	0 15 0	0 15 0	0 15 0	0 15 0	0 15 0
Plate-changing Box for 12 plates	13 2 0	14 10 0	14 10 0	14 10 0	15 15 0	15 15 0	15 15 0	15 15 0	15 15 0	15 15 0	15 15 0	15 15 0
Eastman's Cartridge Film Roll Holder, to carry a roll of film for 12 exposures, which can be inserted or removed in day- light. Covered to match the Camera	1 7 0	1 10 0	1 10 0	1 10 0	1 10 0	1 10 0	1 10 0	1 10 0	1 10 0	1 10 0	1 10 0	1 10 0
Aluminium Stand, extra light	1 15 0	1 15 0	1 15 0	1 15 0	1 15 0	1 15 0	1 15 0	1 15 0	1 15 0	1 15 0	1 15 0	1 15 0
Light "Wooden" Stand, extra high model	2 0 0	2 0 0	2 0 0	2 0 0	2 0 0	2 0 0	2 0 0	2 0 0	2 0 0	2 0 0	2 0 0	2 0 0
Ball and Socket Joint	1 0 0	1 0 0	1 0 0	1 0 0	1 0 0	1 0 0	1 0 0	1 0 0	1 0 0	1 0 0	1 0 0	1 0 0
Extension for using the back com- bination of the lens only	0 10 0	0 10 0	0 10 0	0 10 0	0 10 0	0 10 0	0 10 0	0 10 0	0 10 0	0 10 0	0 10 0	0 10 0
Time Shutter, fitted in front of lens	1 10 0	1 10 0	1 10 0	1 10 0	1 10 0	1 10 0	1 10 0	1 10 0	1 10 0	1 10 0	1 10 0	1 10 0
If instead of the Double Anastigmat, Series III, the Camera is fitted with the Double Anas- tigmat, Series I B, F: 4.8, the cost of the lens will be	6 0 0	6 5 0	6 5 0	6 5 0	7 5 0	7 5 0	8 5 0	8 5 0	7 5 0	7 5 0	7 5 0	7 5 0
If with the Double Anastigmat, Series I C, F: 6.8, the cost of the lens will be	4 5 0	4 15 0	4 15 0	4 15 0	5 5 0	5 5 0	6 5 0	6 5 0	5 5 0	5 5 0	5 5 0	5 5 0

Goerz Hypergon Double Anastigmat

SERIES X. F. 22. Angle 135°.

A special lens for wide angle Interiors, Architecture, Landscapes, Panoramic Views, etc.

The sizes of plates mentioned below are fully covered, even if the camera front is considerably raised. The Hypergon Double Anastigmat is supplied with a star diaphragm in front of the lens, ensuring the equal illumination of the plate.

No.	Equivalent Focus.	Plate covered at F 31.	Code Word.	Prices including Star Diaphragm.		
				£	s.	d.
000	2 $\frac{3}{8}$	6 $\frac{1}{2}$ × 8 $\frac{1}{2}$	Hydrat	6	0	0
000a	3	8 $\frac{1}{2}$ × 10 $\frac{1}{2}$	Hyla	6	15	0
00	3 $\frac{1}{2}$	9 $\frac{1}{2}$ × 13	Hymne	7	5	0
0	4 $\frac{1}{2}$	12 × 15	Hyperbel	8	10	0
1	6	15 × 20	Hyperion	10	0	0
2a	7 $\frac{7}{8}$	24 × 27 $\frac{1}{2}$	Hyrta	12	10	0

The angle of view embraced by this new objective is about 135°, and thus greatly surpasses any of the existing wide-angle combinations.

The diameter of the field of view, or in other words, the diagonal of the plate covered by the Hypergon Lens equals five times the focus, and the longer side of the plate equals four times the focus. This latter proportion amounts in the most exceptional wide-angle lens hitherto made to two only.

The Goerz Double Anastigmat

SERIES IV. F. 11.

RAPID COPYING LENS for full-size Reproductions, Enlargements, Large Groups, Landscapes, Instantaneous Photography, and Interiors.

No.	Equivalent Focus.	Free Aperture.	Normal Size of Plate for copying at F 15.5 to F 22.		Size of Plate covered at F 15.5		Code Word.	Price with Waterhouse Stops.
			in full size.	in reduced size.	for groups.	with smaller stops for landscapes, interiors, etc.		
	in.	in.	in.	in.	in.	in.		
6	12	1 $\frac{1}{16}$	16 × 18	10 × 12	10 × 12	16 × 18	Damara	15 10 0
7	14	1 $\frac{5}{16}$	18 × 22	12 × 15	12 × 15	18 × 22	Darius	20 0 0
7a	16 $\frac{1}{2}$	1 $\frac{9}{16}$	20 × 24	13 × 17	13 × 17	20 × 24	Davina	26 10 0
8	19	1 $\frac{3}{4}$	22 × 25	16 × 18	16 × 18	22 × 25	Dekan	32 10 0
9	24	2 $\frac{1}{8}$	24 × 30	18 × 22	18 × 22	24 × 30	Dictator	48 15 0
10	30	2 $\frac{3}{4}$	28 × 36	22 × 25	22 × 25	28 × 36	Dolomit	80 0 0
11	35	3 $\frac{1}{4}$	34 × 44	24 × 30	24 × 30	34 × 44	Doria	155 0 0
12	47	4 $\frac{5}{16}$	40 × 60	28 × 36	28 × 36	40 × 60	Drusus	280 0 0

Goerz Photo Stereo Binocular combines



- 1.—Opera Glass, magnifying $2\frac{1}{2}$ times.
- 2.—Field Glass, magnifying $3\frac{1}{2}$ times.
- 3.—Photographic Camera, for 24 small or 12 Stereoscopic Views, time or instantaneous photographs, plate $1\frac{1}{2} \times 2$ in.

The definition given by the Double Anastigmat is such that enlargements up to 12×10 inches can be from the negatives.



Price, with pair of **GOERZ DOUBLE ANASTIGMATS**, 3 inches focus, Code word "Stereostig" **£15 0 0**

The same, with pair of **GOERZ RAPID LYNKEIOSKOPS**, focus 3 inches, Code word "Stereolink" **10 0 0**

The Dark Slides are of thin sheet steel, and are placed in a leather wallet a little thicker than an ordinary letter case, and can be carried either in the breast pocket or slung across the shoulders. The prices of the instrument include a leather sling case, and 24 Dark Slides in Wallet.

Pocket Film Cameras fitted with .. Goerz Double Anastigmats.

For the popular $3\frac{1}{4} \times 4\frac{1}{4}$

Daylight Loading Film.

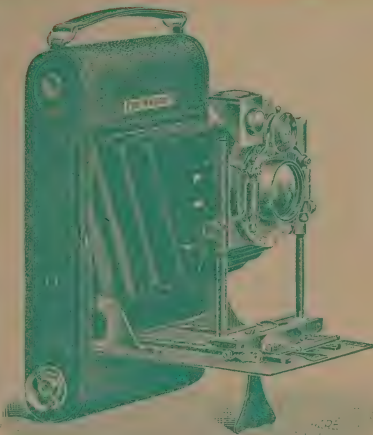


No. 3 Folding Pocket Kodak, with
Double Anastigmat, Series III.,
No. 0, and Bausch & Lomb
Shutter .. **£10 17 6**

Ditto, with Double Anastigmat, Series
III., No. 0, and Sector Shutter
£13 2 6

The "Ensign" Pocket Camera, with
Goerz Double Anastigmat, Series
I C, No. 0, and Bausch & Lomb
"Automat" Shutter **£8 8 0**

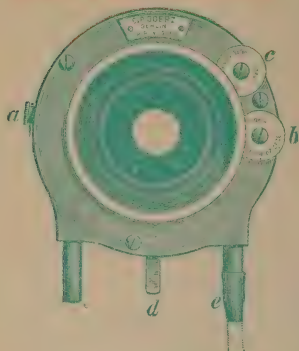
Ditto, with Double Anastigmat, Series
I C, No. 0, and Sector Shutter
£10 13 0



The "Ensign" Pocket Camera.

Either of the above Cameras can be well recommended in all cases where portability is essential. They are light, practical, and when fitted with the Goerz Double Anastigmats, give negatives capable of considerable enlargement if such is desired.

Goerz Sector Shutter



is the most perfect of all shutters attached directly to the lens itself. It provides automatically for exposures from $\frac{1}{2}$ second up to $\frac{1}{150}$ th second, and can also be used for time work of any description.

Small model, suited for all lenses, the largest stop of which does not exceed 24 mm. = 1 inch £3 10 0

Large model, for lenses with largest stop up to 32 mm. = $1\frac{1}{4}$ inches 4 10 0

Cost of fitting, 6/- to 15/- each, according to size.

** No charge is made for fitting when the Sector Shutter is supplied with a Double Anastigmat.

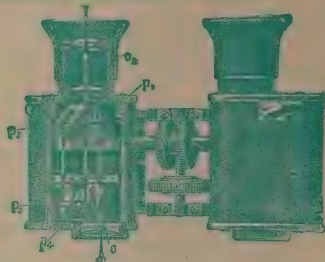
Goerz Trieder Binoculars.

Highest Power.

Largest Field.

Finest Definition.

They have been declared to be the best Glasses for the Theatre, Field, Races, Navy and Army.



3	times magnifying power	£6	5	0
6	"	"	7	10 0
9	"	"	8	15 0
12	"	"	10	0 0

The whole circle shows the field of view as seen in a Goerz Trieder Binocular, the inner that seen with an ordinary field glass of equal magnification.

SPECIAL PAMPHLET

FREE

ON APPLICATION.

C. P. GOERZ, 1-6 Holborn Circus, London, E.C.

BLOCKS: **PHOTO-ENGRAVING** is a profitable field,
too much neglected by the Photographer
and Stationer

PHOTOGRAPHERS! Supply our blocks from your own
photographs and thus pocket profits
which generally escape elsewhere.



TRAFALGAR SQUARE.

BY HAROLD HOOD.

Printing and Publishing of all kinds of **Books**,
literary or technical—especially photographic.

*Our Specialty:—***Illustrated Work.** Engraving and
Printing all done at our own fine works.

Election Portrait Cards.—An absolute necessity to
the modern candidate. We illustrate and print these
complete, and have many styles to show.

Apply, *on trade heading*, for Samples, enclosing stamp.

HOOD & CO., Ltd.

ENGRAVERS,
PRINTERS,
DESIGNERS,

Telephone 0518.

St. Bride Works, Middlesbrough.

(Block as above, portrait or other subject, 6/3 post free).

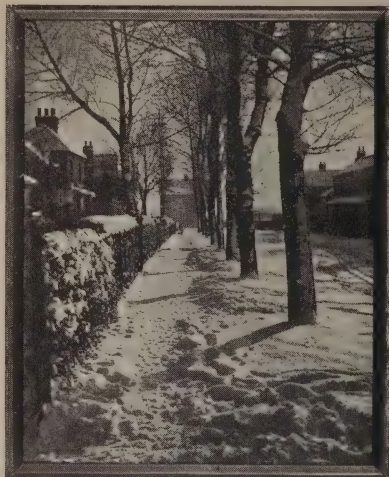
[See following pages.

HOOD & CO., Ltd., St. Bride Works, MIDDLESBROUGH.

3-Colour Blocks.

(Photographs in natural colours for letterpress printing).

3-Colour Blocks can be made direct from the natural objects, and are magnificent for trade purposes. Labels, fabrics, manufactures, paintings, pottery, etc., can be reproduced in colours astonishingly truthful to the originals and at small cost.



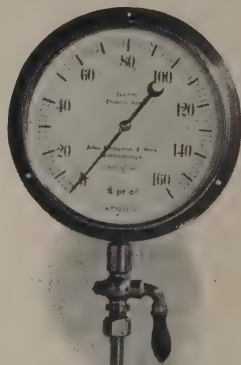
A SUBURBAN ROAD.

(Copper Block this size, 5/- post free).

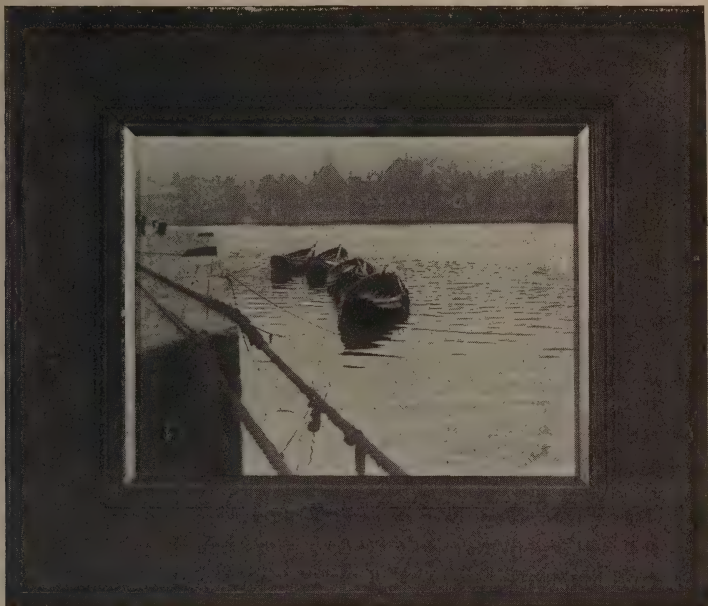


Send for Sample DESIGNS for
PHOTOGRAPHERS' NOTE
BOOKS — HEADINGS, — Free.

SPECIMENS OF BLOCKS FOR
CATALOGUES AND CIRCULARS.



Small objects are best sent for reproduction direct to our works.



"COBLES AND RIPPLES."

BY HAROLD HOOD.

"PETER." BY MR. H. BROWN,
AYRESOME STREET, MIDDLESBROUGH.

Every photographer or stationer should publish a View Book illustrating his district, and should not be deterred because a competitor already runs one. We can quote for both engraving and printing at prices to produce liberal profit to our customer.

BEFORE ORDERING PICTORIAL POST CARDS

GET OUR PRICES:

We can supply the finished cards at prices yielding our customer a clear profit of
CENT. PER CENT.

HOOD & CO. LIMITED,
St. Bride Works,
MIDDLESBROUGH.

HOOD'S NEW & REDUCED SCALE FOR HALF-TONE BLOCKS IN BEST COPPER PROCURABLE.

From good photographs

(If negatives sent, slight charge for printing).



From different photos.		PRICES, EACH.	
RECTANGULAR:	One.	Two.	Four.
1½ by 1 in.	3/9	3/8	3/7
2 by 1½ in.	4/6	4/4	4/2
2½ by 2 in.	4/9	4/8	4/6
3 by 2½ in.	5/-	4/9	4/6
4 by 3 in.	6/-	5/10	5/8
			Sixteen or more.
			3/2
			3/6
			4/-
			4/-
			4/11

**REGULAR
CONTRACTS
AT BOTTOM PRICES.**

MEDAL BLOCKS, by a perfectly new process originated by us. Send your own or customer's medal and P.O. for 6/- and receive an attractive block in return. Let people see your awards; do not waste their value in some old drawer.

NOTES ON ABOVE SCALE.—Prices are for square blocks. Ovals and Circles 6d. extra on small sizes. Vignetting, 15 per cent. extra (1/- on small sizes). Packing and post, 1 block 3d.; 2, 4d.; 4, 6d.; 8, 9d.; 16, 1/- . Large blocks from 7½d. to 4d. per square inch, depending upon size and style.

TO MANUFACTURERS.—Please ask for Quotations for Catalogues, Booklets, Circulars, etc., or for printing of "B.J Almanac" insets.

HOOD & CO., LTD.,
St. Bride Works, MIDDLESBROUGH.



Circular Block as this, post free for 5/6



No. 1.

YE GENIUS : "I have tried them all - not one will bring out the subtle charm of my lady's face - Ha! why should I not bring down my name with glory to posterity ! I will produce a perfect paper Sublime thought - come !"

"Wellington" Bromide † Platine
-Matt
"Wellington" S.C.P.

manufactured by

Wellington and Ward : Elstree . Herts.

The

"WELLINGTON"

PLATINO-MATT SURFACE

Bromide Paper.

Made in the following Grades: SMOOTH, S. ROUGH, R.
Tinted Rough, TR. (Cream Crayon.) SPECIAL THICK, X.

PRICES:

					s.	d.		
3½ × 3½	...	28	Sheets	...	1	0		
4½ × 3½	...	24	"	...	1	0		
5 × 4	...	18	"	...	1	0		
5½ × 4	...	14	"	...	1	0		
6 × 4½	...	14	"	...	1	0		
6½ × 4½	...	12	"	...	1	0		
7½ × 5	...	12	"	...	1	3		
8 × 6	...	12	"	...	1	9		
8½ × 6½	...	12	"	...	2	0		
10 × 8	...	12	"	...	2	9	Six Sheets.	
12 × 10	...	12	"	...	4	2	s. d.	
12½ × 10½	...	12	"	...	4	6	...	2 2
15 × 12	...	12	"	...	6	3	...	2 4
15½ × 12½	...	12	"	...	6	9	...	3 3
18 × 15	...	12	"	...	9	6	...	3 6
23 × 17	...	12	"	...	12	6	...	5 0
25 × 21	...	12	"	...	18	0	...	6 9
								9 6

6d. Packets.—All sizes up to ½-Plate. Cut to order.

25 feet Rolls.

					s.	d.
15 inches wide	...	...	...	...	13	3
20 "	"	"	...	...	17	6
22 "	"	"	...	...	20	0
25 "	"	"	...	...	22	0
30 "	"	"	...	...	26	6
40 "	"	"	...	...	35	0

BOXES.—1 Gross (144 Sheets) 5½ × 4 ... 10 0
 ½ " (72 ") ... 5 0



No 2.

YE GENIUS: ".... And the Lady Belinda hummed these all"^(tears)
 "but courage! Sacrifice is the inevitable companion
 of invention — and my paper must be of the finest.

The "Wellington"

BROMIDE plating matt. PAPER

and the

○ S SLIDE ○ C CONTACT ○ P PAPER ○

✧ for gaslight printing and developing ✧

Wellington and Ward ... Elstree .. Herts.

ENAMMO

... A ...

Glossy Surface
Bromide Paper.



FOR the dull winter months, when it is next to impossible to secure a print on P.O.P., we have placed in the Photographer's hands a paper possessing the advantages of both P.O.P. and Bromide in one.

It is manipulated in the same manner as our Platino-Bromide, and possessing, as it does, nearly the same rapidity, the two papers may be worked side by side.

If desired, the image may be toned to a sepia.



No. 3.

Ye Genius: "This mill works like a dream - And these fine Cambric shirts make a grand pulp - Dear Belinda picked all the embroidery with her little scissors - 'Your great paper shall have no spots Alphonso' she said" -

The "Wellington"

are manufactured by
Wellington

and **Ward** • of **Elstree Herts** • • • •

P.O.P.
Bromide
(platinotype)

S.C.P.
and **HUMS**

THE ...

"WELLINGTON" ENAMMO

A GLAZED SURFACE BROMIDE



Made in Three Shades—MAUVE, PINK, WHITE.

Special Thick, MAUVE only.

Two Grades.—THIN and SPECIAL THICK.—All One Price.

**For WINTER WORK. Equalling Prints
on P.O.P. . For PORTRAITS, Midgets,
Stamps, etc. . For SCIENTIFIC Work.**

Per Packet of 12 Sheets.	PRICES.								s.	d.
$3\frac{1}{2} \times 3\frac{1}{2}$	0	6
$4\frac{1}{4} \times 3\frac{1}{4}$	0	8
5×4	1	0
$6 \times 4\frac{1}{4}$	1	3
$6\frac{1}{2} \times 4\frac{3}{4}$	1	6
$7\frac{1}{2} \times 5$	1	8
$8\frac{1}{2} \times 6\frac{1}{2}$	2	6
10×8	3	6
									12 Sheets.	6 Sheets.
12×10	s. d.	s. d.
$12\frac{1}{2} \times 10\frac{1}{2}$	5 0	2 6
15×12	5 6	2 9
$15\frac{1}{2} \times 12\frac{1}{2}$	7 0	3 6
$15\frac{1}{2} \times 12\frac{1}{2}$	7 6	3 9
23×17	14 0	7 0
25×21	21 0	10 6

25 feet Rolls.

18 inches wide	...	s. d.	17 0	|	36 inches wide	...	s. d.	34 0
----------------	-----	-------	------	--	----------------	-----	-------	------

Special Sizes cut to Order.



No. 4.

Ye Genius : "Ha! Nothing like doing it all yourself — The grain is exquisite Now for the Coating !"

"Wellington"

"Wellington"

"Wellington"

"Wellington"

P.O.P.

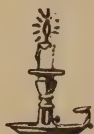
Bromide (platinotype)

S.C.P.

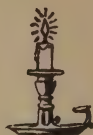
Films

Wellington and Ward
Elstree . Herts.

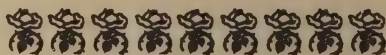
THE
"WELLINGTON"
S.C.P.



Slow Contact Paper.



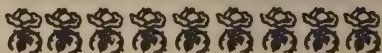
— For —
PRINTING
 — and —
DEVELOPING
 by GAS or other
ARTIFICIAL
 — LIGHT. —



It is manipulated in the same manner as our Bromide Paper and manufactured in four grades, **Matt, Glossy, and Art** (White and Tinted), giving the most beautiful soft pearly effects.



This paper may also be had in the necessary thickness for Post Cards on a thick grade paper, both in Glossy and Matt.





No. 5

Ye GENIUS : "Fame ! Fame Belinda !! What care I for rags or hunger ! The greatest success of the age is coming into being !"

Ye LADY BELINDA : "Dear Alphonso !"

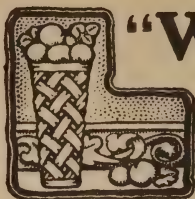
[But Alphonso had not yet seen the name of :

"Wellington"

on

Bromide (platinomat) , S.C.P.,
P.O.P. and Films

Wellington and Ward
Elstree - Herts



"WELLINGTON"

S.C.P.

(Slow Contact Paper.)

FOR GASLIGHT DEVELOPMENT.

PRICES:

In four Grades: SMOOTH (Matt), GLOSSY,
and ART (White and Tinted).¹

				s.	d.		
28 $\frac{3}{4}$	×	18 $\frac{3}{4}$	...	30	Sheets	...	0 6
21 $\frac{1}{2}$	×	21 $\frac{1}{2}$	...	20	"	...	0 6
31 $\frac{1}{4}$	×	21 $\frac{1}{4}$	...	34	"	...	1 0
31 $\frac{1}{4}$	×	31 $\frac{1}{4}$	...	30	"	...	1 0
31 $\frac{1}{2}$	×	31 $\frac{1}{2}$	...	28	"	...	1 0
41 $\frac{1}{4}$	×	31 $\frac{1}{4}$	...	24	"	...	1 0
5	×	4	...	18	"	...	1 0
5 $\frac{3}{4}$	×	4	...	14	"	...	1 0
6	×	4 $\frac{1}{4}$	...	14	"	...	1 0
6 $\frac{1}{2}$	×	4 $\frac{3}{4}$	...	12	"	...	1 0
7 $\frac{1}{2}$	×	5	...	12	"	...	1 3
8	×	6	...	12	"	...	1 9
8 $\frac{1}{2}$	×	6 $\frac{1}{2}$	...	12	"	...	2 0
10	×	8	...	12	"	...	2 9
12	×	10	...	12	"	...	4 2
12 $\frac{1}{2}$	×	10 $\frac{1}{2}$	...	12	"	...	4 6
15	×	12	...	12	"	...	6 3
15 $\frac{1}{2}$	×	12 $\frac{1}{2}$	...	12	"	...	6 9
18	×	15	...	12	"	...	9 6
23	×	17	...	12	"	12 6	...
25	×	21	...	12	"	18 0	...
							Six Sheets.
							s. d.
							2 2
							2 4
							3 3
							3 6
							5 0
							6 9
							9 6

25 feet Rolls.

					s.	d.
15 inches wide	...	...	...	...	13	3
20 "	"	"	...	...	17	6
22 "	"	"	...	...	20	0
25 "	"	"	...	...	22	0
30 "	"	"	...	...	26	6
40 "	"	"	...	...	35	0

BOXES.—1 Gross, (144 Sheets) 5 $\frac{3}{4}$ × 4 ... 10 0
 $\frac{1}{2}$ " (72 ") ... 5 0



No. 6

YE LADY BELINDA: "Speedily and evenly, my Alphonso!"

YE GENIUS: "Play not upon my nerves, Love.... the emulsion is perfection, and coating is child's play - All is well!"

The "Wellington"

PAPPS

P.O.P. Bromide S.C.P.
(platin matt)

Wellington and Ward
ELSTREE · HERTS.

"WELLINGTON"



P.O.P.



ROLLS, 25 ft. × 35 ins.

Economical for Professional Work.

15/-

PRICES.

PINK, MAUVE, WHITE, and MATT SURFACE (White only).

2 $\frac{3}{4}$ × 1 $\frac{3}{4}$	per packet of 54 Sheets	6d.	Per 1 Qr. 24 × 20... 17/6
2 $\frac{1}{2}$ × 2 $\frac{1}{2}$	" 36 "	6d.	SHEETS, 24 $\frac{1}{2}$ × 17.
3 $\frac{1}{2}$ × 2 $\frac{1}{4}$	" 57 "	} 1/= each Pkt.	Per 1 Quire ... 15 0
3 $\frac{1}{4}$ × 3 $\frac{1}{4}$	" 47 "		" $\frac{1}{2}$ " ... 7 6
3 $\frac{1}{2}$ × 3 $\frac{1}{2}$	" 40 "		" $\frac{1}{4}$ " ... 4 0
4 $\frac{1}{4}$ × 3 $\frac{1}{4}$	" 36 "		" $\frac{1}{2}$ " ... 1 4
5 × 4	" 24 "		BOXES OF
6 × 4 $\frac{1}{4}$	" 24 "		1 GROSS SHEETS.
6 $\frac{1}{2}$ × 4 $\frac{3}{4}$	" 16 "		C.-de-V., 3 $\frac{1}{2}$ × 2 $\frac{1}{4}$... 1 8
7 $\frac{1}{2}$ × 5	" 13 "		" 3 $\frac{5}{8}$ × 2 $\frac{3}{4}$... 1 10
8 × 6	" 12 "		Cabinets 5 $\frac{1}{2}$ × 4 ... 4 8
8 $\frac{1}{2}$ × 6 $\frac{1}{2}$	" 9 "		" 5 $\frac{3}{4}$ × 4 ... 5 0
10 × 8	" 6 "		Size ... 8 × 6 ... 10 6
12 × 10	" 4 "		

SPECIAL SIZES CUT TO ORDER.

6d. PACKETS.—ALL SIZES UP TO $\frac{1}{2}$ -PLATE. Cut to Order.

P.O.P. Thick. SAME PRICES. MAUVE ONLY.



No. 7

YE GENIUS: "Behold, Belinda! Our fortune hangs upon this line!

You shall have a new robe now every day of your life!"

YE LADY BELINDA: "Dear Alphonso - I want only your success."

Wellington & Ward
of Elstree, Herts.

manufacture the
"Wellington" FILMS

"WELLINGTON" Carbon Tissue

Made in the following Stock Colours:—

- | | | |
|---------------------|-------------------------|------------------|
| 1. Engraving Black. | 6. Photographic Purple. | 10. Cold Sepia. |
| 2. Warm Black. | 7. Photographic Brown. | 11. Roman Sepia. |
| 3. Grey. | 8. Purple Brown. | 12. Terra Cotta. |
| 4. Marine Blue. | 9. Sepia. | 13. Red Chalk. |
| 5. Sea Green. | | |

SHEETS.

In any of the above colours, sensitive or insensitive.

						s.	d.
4½	×	3½	per Packet of 1 dozen Sheets	...	...	0	5
5	×	4	" " "	...	...	0	7
6	×	4½	" " "	...	...	0	8
6½	×	4½	" " "	...	...	0	10
8½	×	6½	" " "	...	...	1	6
10	×	8	" " "	...	...	2	0
12	×	10	" " "	...	...	3	0
15	×	12	" " "	...	...	4	0

ROLLS.

				s.	d.
12 feet	×	30 inches	...	7	6
6 "	×	30 "	...	4	0
3 "	×	30 "	...	2	6

Note.—Nos. 1, 9, and 12 are kept in Stock freshly sensitised.

"Enammo" Transparency Tissue

(EXTRA FINE).

SHEETS.

						s.	d.
3½	×	2½	per Packet of 1 dozen Sheets	...	...	0	5
4½	×	3½	" " "	...	...	0	7
5	×	4	" " "	...	...	1	0
6½	×	4½	" " "	...	...	1	3
8½	×	6½	" " "	...	...	2	0
10	×	8	" " "	...	...	3	0
12	×	10	" " "	...	...	4	0
15	×	12	" " "	...	...	5	6

ROLLS.

				s.	d.
12 feet	×	30 inches	...	8	6
6 "	×	30 "	...	4	6
3 "	×	30 "	...	2	6



No. 8

YE GENIUS: "Ha! Ha! Sample of paper from the firm of Wardington and Well - never heard of them - Closed will be their doors when My great paper bursts upon the photographic world. - But let us try it Belinda, let us try it for fun! Let us calculate the percentage of its inferiority -"

"Wellington" Bromide
platinum matt

P.O.P. AND S.C.P. AND FILMS

© WELLINGTON & WARD. ELSTREE. HERTS.

“WELLINGTON” Carbon Tissue *Contd.*

Paper Supports for Single or Double Transfer.

Made in Thin, Medium, Toned Etching, and Hand Made Rough Drawing

SHEETS.

					Thin, Medium, or Toned Etching.			Hand Made Rough Drawing.	
					s.	d.		s.	d.
4 $\frac{1}{4}$	×	3 $\frac{1}{4}$	..	...	0	3	<div> <div>Per Packet of one dozen Sheets.</div> <div>}</div> </div>	0	6
5	×	4	...	...	0	4		0	9
6 $\frac{1}{2}$	×	4 $\frac{3}{4}$	...	...	0	5		1	0
8 $\frac{1}{2}$	×	6 $\frac{1}{2}$	...	...	0	10		2	0
10	×	8	...	...	1	4		3	6
12	×	10	...	...	2	0		4	6
15	×	12	...	...	2	8		6	0

Per
Packet
of
one dozen
Sheets.

HAND MADE ROUGH DRAWING, 30 ins. × 22 ins., 1/- per Sheet.

ROLLS.

One Band, 12 ft. × 30 ins., THIN, MEDIUM, or TONED
ETCHING 3s.

Note.—All sizes are cut a trifle larger to allow of correct transfer.

Temporary Supports for Double Transfer.

FLEXIBLE TEMPORARY SUPPORTS.

					s.	d.
4 $\frac{1}{4}$	×	3 $\frac{1}{4}$	per Packet of 1 dozen Sheets	...	0	7
5	×	4	” ” ”	...	0	9
6 $\frac{1}{2}$	×	4 $\frac{3}{4}$	” ” ”	...	1	0
8 $\frac{1}{2}$	×	6 $\frac{1}{2}$	” ” ”	...	1	8
10	×	8	” ” ”	...	2	4
12	×	10	” ” ”	...	3	3
15	×	12	” ” ”	...	4	6

GROUND OPAL TEMPORARY SUPPORTS.

				Per Doz. s.	d.					Per Doz. s.	d.
4 $\frac{1}{4}$	×	3 $\frac{1}{4}$	...	1	0	10	×	8	...	8	6
5	×	4	...	1	6	12	×	10	...	15	0
6 $\frac{1}{2}$	×	4 $\frac{3}{4}$	...	2	6	15	×	12	...	24	0
8 $\frac{1}{2}$	×	6 $\frac{1}{2}$	...	4	6						

Note.—All Flexible Supports are cut a trifle larger to allow of correct transfer.

SPECIAL NOTE.—All sizes not listed cut to order,



No. 9

YE GENIUS: "Ha! what is this! Impossible! It cannot be that theirs is... theirs is —! Belinda will tell me my eyes are playing me false! Where is Belinda!"

The "Wellington"

Bromide Papers

also

Films.

Wellington
and Ward
7 Elstree
Herts.

▷ FOR THE MAKING OF ENLARGED NEGATIVES ◁

The LATEST INTRODUCTION.

“WELLINGTON” Celluloid Films

For all Daylight Loading Cameras



Daylight Cartridges.

SIZES.	12 Exposures			6 Exposures		
		s.	d.		s.	d.
$1\frac{1}{2} \times 2$...	1	3	...	—	—
$1\frac{3}{8} \times 2\frac{1}{2}$...	—	—	...	0	6
$2\frac{1}{4} \times 2\frac{1}{4}$...	—	—	...	0	7
$2\frac{1}{4} \times 3\frac{1}{4}$...	1	9	...	0	10
$2\frac{1}{2} \times 4\frac{1}{4}$...	2	6	...	1	3
$3\frac{1}{2} \times 3\frac{1}{2}$...	2	6	...	1	3
$3\frac{1}{2} \times 4\frac{1}{4}$...	3	0	...	1	6
$4\frac{1}{4} \times 3\frac{1}{4}$...	3	0	...	1	6
4×5	...	3	9	...	1	11
5×4	...	3	9	...	1	11
7×5	...	6	8	...	3	4

Less than 6 Exposures not manufactured, but all sizes not mentioned above are made to order.



No. 10

YE GENIUS: "The one on the right, my love, think you not that it is more beautiful than the one on the left?"

YE LADY BELINDA: "The one on the right must be yours! Oh my Alphonso, it is exquisite! There is no comparison — Oh my clever Alphonso! my love, you have —"



("SLOW CONTACT PAPER") for Gaslight printing & developing
WELLINGTON & WARD. ELSTREE. HERTS

"WELLINGTON"


The
Latest
Introduction



Celluloid Films

For Roll-Holders

Daylight Roll-Holder Cartridges

			s.	d.
3¼ in. for 12 Exposures	(3¼ × 4¼)	...	3	0
4¼ in. „ 12 „	(4¼ × 3¼)	...	3	0
4 in. „ 12 „	(4 × 5)	...	3	9
5 in. „ 12 „	(5 × 4)	...	3	9
6½ in. „ 12 „	(6½ × 4½)	...	6	0
7 in. „ 12 „	(7 × 5)	...	6	8



6 Exposures made to Order at half-price, plus 1d. any size.

Films for Roll-Holders—(Old Form)

On Wooden Ceres.

(NOT Daylight Loading.)



			s.	d.
3¼ in. for 24 Exposures	(3¼ × 4¼)	...	4	0
4 in. „ 24 „	(4 × 5)	...	6	6
4¼ in. „ 24 „	(4¼ × 3¼)	...	4	0
4½ in. „ 24 „	(4½ × 6½)	...	9	6
5 in. „ 24 „	(5 × 7½)	...	13	0
6½ in. „ 24 „	(6½ × 8½)	...	16	0
8 in. „ 24 „	(8 × 10)	...	25	0

48 and 60 Exposures in proportion.

12 Exposures made to Order at half-price, plus 2d. any size.

When ordering please particularly specify whether
CELLUOID or GELATINE Films are required,
... and for what Camera or Roll-Holder. . .
Gelatine Film Price List, &c., on application.



No. 11

YE GENIUS: "Failed! Belinda, Failed!! Fame and name
belong not to me! — Failed!! f-a-i-l-e-d---!"

The "Wellington"

PLATINO-MATT SURFACE

Bromide Papers

WELLINGTON & WARD ELSTREE. HERTS.

... THE ...

"WELLINGTON" GELATINE FILMS.

Daylight
Cartridges,
Roll-Holders.



Cut Sheets,
&c., for ALL
CAMERAS.

Daylight Cartridges.

SIZE.			s. d.	s. d.		s. d. s. d.
1½ × 2	...	6 Exposures	0 6	...	12 Exposures	0 10
1½ × 2½	...	6 "	0 6			
2¼ × 2¼	...	6 "	0 6			
2¼ × 3¼	...	6 "	0 10	0...8	12 "	1 9 1 3
2½ × 4¼	...	6 "	1 3	0.10	12 "	2 0 1 6
3½ × 3½	...	6 "	1 3	0.10	12 "	2 0 1 6
3¼ × 4¼	...	6 "	1 6	0 1.1	12 "	3 0 1 9
4¼ × 3¼	...	6 "	1 6	0 1.1	12 "	3 0 1 9
4 × 5	...	6 "	1 11	1...2	12 "	3 0 2 3
5 × 4	...	6 "	1 11	1...2	12 "	3 0 2 3
7 × 5	...	6 "	3 4	2...1	12 "	6 8 4 0

Less than 6 Exposures not manufactured, but all sizes not mentioned above are made to order.



No. 12

YE GENIUS : "I'll make my fortune instead, love, printing
prints on the other man's paper -"

YE LADY BELINDA : "My wise Alphonso !"

"Wellington" Bromide
(platino-matt surface)

"Wellington" S.C.P.

WELLINGTON & WARD ELSTREE . HERTS .

THE . .

"WELLINGTON"

Gelatine Film.

PRICES.

Daylight Cartridges
for ALL Cameras.

FILMS FOR ROLL-HOLDERS.

Daylight Roll-Holder Cartridges.

					s.	d.
3½ in., for 12 Exposures	(3½ × 4½)	...	...	...	1	9
4½ in., „ 12 „	(4½ × 3½)	..	...	...	1	9
4 in., „ 12 „	(4 × 5 )	...	...	...	2	3
5 in., „ 12 „	(5 × 4 )	...	...	...	2	3
6½ in., „ 12 „	(6½ × 4½)	...	...	...	3	3
7 in., „ 12 „	(7 × 5 )	...	...	...	4	0

6 Exposures made to order at half-price plus 1d., any size.

Films for Roll-Holders (Old Form). On Patent Hollow Cores.
(NOT Daylight Loading).

					s.	d.
3½ in., for 24 Exposures	(3½ × 4½)	...	...	...	2	4
4 in., „ 24 „	(4 × 5 )	...	...	...	3	4
4½ in., „ 24 „	(4½ × 3½)	...	...	...	2	4
4¾ in., „ 24 „	(4¾ × 6½)	...	...	...	5	0
5 in., „ 24 „	(5 × 7½)	...	...	...	6	0
6½ in., „ 24 „	(6½ × 8½)	...	...	...	9	0

12 Exposures made to order at half-price plus 2d., any size.

CUT FILMS.

		s.	d.			s.	d.
4½ × 3½	Packet of 1 doz.	1	2	8½ × 6½	Packet of 1 doz.	4	6
5 × 4	„ „	1	8	10 × 8	„ „	6	6
6½ × 4¾	„ „	2	6	12 × 10	„ „	9	9
7½ × 5	„ „	3	0	15 × 12	„ „	14	6

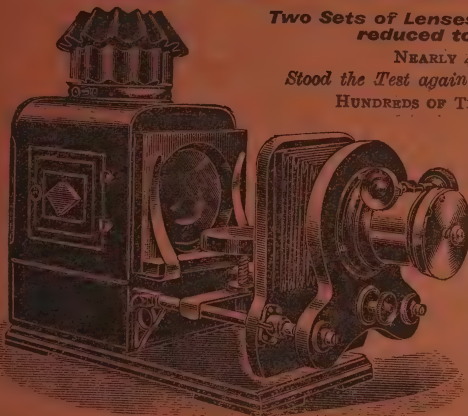
SPECIAL SIZES CUT TO ORDER.

IMPORTANT.—When ordering please particularly specify whether CELLULOID or GELATINE Films are required, and for what Camera or Roll Holder.

HUGHES' MARVELLOUS PAMPHENGOS.

Reduced to £4 4s.

HUGHES' SCIENCE PAMPHENGOS.



Two Sets of Lenses, Bellows Body, reduced to £6 6s.

NEARLY 4,000 SOLD.

Stood the Test against all Imitations.

HUNDREDS OF TESTIMONIALS.

The most powerful Oil-lighted Lantern extant. Stood the test over 16 years against all imitations. No smell. No smoke. No broken glasses. Perfect combustion. Pure white light, approaching lime-light. No chimney dampers, which are evils to be eschewed.

The PAMPHENGOS is scientifically constructed, therefore burns steadily without any trouble. It has 4-in. finest condensers and front lenses. The perfection of an Oil-lighted Lantern. Gives 12 to 14 feet brilliant pictures.

WE CHALLENGE COMPARISON.

Hughes' Universal 4-Wick Lantern,

With 4-inch Condensers and Portrait Lens, 18/6.

Marvellous Value. Blow-through Jets, 8/6; Mixed ditto, 12/.

Plain Photographs, -/6 and 1/-; Coloured, 1/-, 1/6 and 3/6.

New Slides—CORONATION, &c.

Send for GRANDLY ILLUSTRATED CATALOGUE AND EFFECTS. 180 choice original Engravings of the Finest Collection of Optical Projecting Instruments in the world. Price 6d., postage 3d. Illustrated Bijou ditto, post free, 5d. List of 60,000 Slides (Tales, Hymns, Scripture, &c.) 6d., postage 3d.

Cheapest House for Lantern Outfit.

Before Purchasing either a Lantern or a Cinematograph,

CONSULT THE SPECIALIST—

W. C. HUGHES, Brewster House, Kingsland, London, N.
82 Mortimer Rd.,

ESTABLISHED OVER 30 YEARS.

Large Illustrated Cinematograph Lists, 6d., postage 3d. Beautifully Illustrated Film Lists, 8d.

C 2 [See following 7 pages

HUGHES' IMPERIAL ROTOGRAPH.

Automatic Combination Lantern and Scope.

For 1,000 feet of Film.

NOTE—The difficulty of Multiple Sprocket Wheels overcome.

SUCCESS AT LAST!

1,000 feet of Film or more runs through as easy as a glove by aid of Mr. Hughes' improved
FIREPROOF POOL SUPPLY.

RESULTS PERFECT. LESS WEIGHT. LESS VIBRATION.

PORTABILITY AND STEADY PICTURES.

We don't ask £45 for this Outfit, which it is worth, but quote same at net price, viz. :

£21 10s. Od.

A REALLY HIGH-CLASS TECHNICAL MACHINE.

The above embraces all the Improvements embodied below.

Hughes' Rotograph, *Combination Lantern and Scope.*

AUTOMATIC.

PERFECT ALTERNATING PICTURES.

SURPASSES ALL OTHERS FOR RESULTS AT
ANYTHING NEAR THE PRICE.

Advantages over any other Combination
of this kind :—

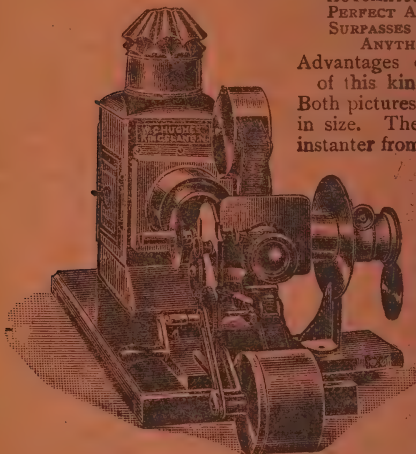
Both pictures projected being nearly equal
in size. The change automatically made
instantly from Film to Lantern Slide. The

machine is perfect, flicker
reduced to a minimum.

Steady, silent, sunk-film
cage, therefore does not in-
jure the Films. High-class
engineer's work. Every part,
Stand included, solid brass.

Superb Mechanism. Latest
improvements. Price re-
duced to **£16 16s. Od.**

These machines give better
results than many showing at
the principal Theatres and
Music Halls costing double
or treble.



HUGHES' CINEMATOGRAPH ATTACHMENT THE PHOTO ROTOSCOPE.

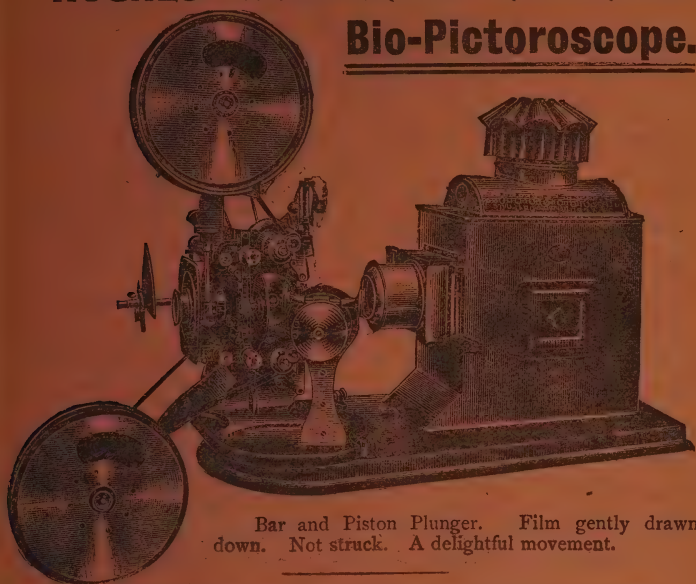
Reduced to **£7 7s.** Can be attached to any Lantern. Perfect results.

Ditto, with Automatic Combination Lantern and Scope, **£11 11s.**

MARVELLOUS VALUE.

W. C. HUGHES, Specialist in Cinematographs & Optical Projection,
BREWSTER HOUSE, 82, MORTIMER ROAD, KINGSLAND, N.

HUGHES' WONDERFUL REVERSING Bio-Pictoroscope.



Bar and Piston Plunger. Film gently drawn down. Not struck. A delightful movement.

The **FILM CAGE** or **TRAP** has an entirely new and novel movement.

Films registered in cage without moving either this or the lens. All accomplished while film is running. This, together with the

ADJUSTABLE SPROCKET WHEEL, enables any number of pictures being centred accurately and instantly in the cage and on the screen exactly in the same place; also

REVERSES THE FILM, producing great fun. Film kept on screen as long as you like.

COLOURED SCENIC EFFECTS.

Sunsets night and day,
&c., produced by—

Mr. Hughes' FILM TINTER.

Beautiful blending of colours—a secret process absolutely transparent.

FLICKERING REDUCED TO A MINIMUM.

Sunk film cage. Films last a lifetime. The value of these improvements cannot be over-estimated by the cinematographist. Patents applied for. Without exception this is the

Chief of Cinematographs.

GRANDLY ILLUSTRATED CINEMATOGRAPH LIST. PRICE 6d., POSTAGE 2d.

W. C. HUGHES, Specialist

(Over 30 Years' Reputation),

Brewster House, 82, Mortimer Road, Kingsland, London, N.

HUGHES' MOTO BIJOU Living Picture Camera.

The latest and most approved Camera for amateur Photography. Can be used as a Camera and as a Printing Machine.

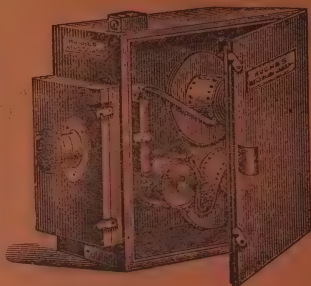
**SIMPLICITY
THEREFORE
PERFECTION.**

The Adjustable Shutter enables the operator to alter the slot from $\frac{3}{4}$ ins. to $\frac{1}{4}$ in. opening to suit subject. Most carefully and scientifically constructed.

Reduced to £12 12s.

HUGHES' MOTO BIJOU MAGAZINE CAMERA, for taking 500 to 1000 lengths of film. Price **£35**. A magnificent instrument, has taken the most perfect negatives.

HUGHES' COMPLETE DEVELOPING AND FIXING APPARATUS FOR FILMS. The most simple and effective. Price **£6 10**.



Hughes' Perfect La Petite Cinematograph Snap-shot Camera.

PRINTER, PROJECTOR, REVERSER,
FITTED WITH HIGH-CLASS LENSES.

PRICE £6 6s., REDUCED TO £5 10s.

EXTRAORDINARY VALUE.

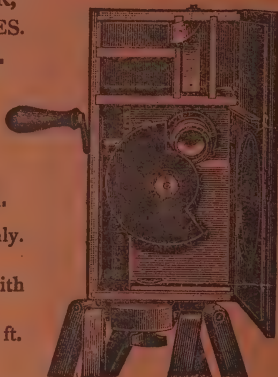
No Complications. Simple and easy to work.

Hughes' Petite AMATEUR PROJECTOR.

For projecting, reversing, and enlarging only.
Price **£3 17s. 6d.**

Lanterns from **21/-** to **30/-** each, with oil lamp.

Sensitive Films, positive and negative, 25 ft.
3/6 each.



GRANDLY ILLUSTRATED CATALOGUE of Bio-Pictoroscope, Photo-Rotoscope Peepshow Cameras, Developing Apparatus, &c. Postage 6d.

Hughes' Instructive Essay on Cinematographs, 5d. Valuable Hints and a Guide. New Grandly Illustrated Film Lists, 8d. Ordinary Film List, 2d., post free.

W. C. HUGHES, Specialist, Brewster House, 82 Mortimer Rd., Kingsland, LONDON, N.
ESTABLISHED OVER 30 YEARS.

STREET CINEMATOGRAPHS, Or OUTDOOR THEATRE.

A Palpable Hit!

Still a Great Success!!

**Either Winter or Summer
GREATEST MONEY-TAKER OF
THE CENTURY.**

Standard Sized Film used

**HUGHES' New Patent
PHOTO-ROSCOPE**

**ACETYLENE STREET
CINEMATOGRAPH.**

Portable, unique. Fourteen people can see at one time, **£12 12s.**

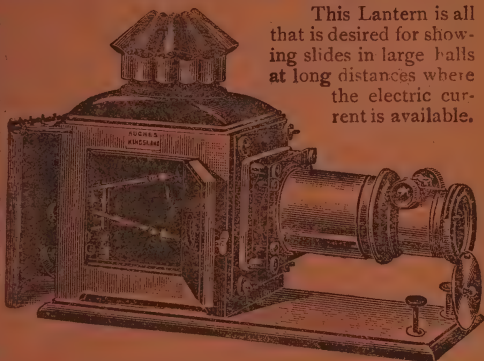
Hughes' Street Cinematographs.

Twenty People can see at once. A tremendous success. Price **£21 10s. complete.**
DUPLEX ditto, for 40 people, £38 10s.



HUGHES' LONG RANGE LECTURER'S ELECTRIC LANTERN.

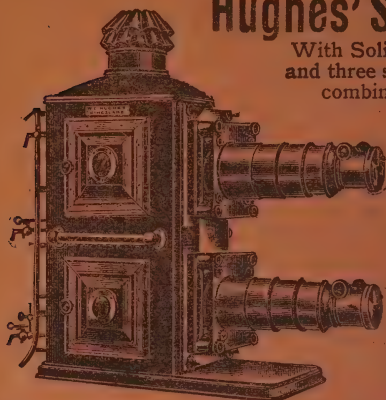
A very substantial and superior Lantern. Large sized mahogany body lined with iron, extra solid brass front, with 4½ inch Condensers, mounted in brass screw cells, large front 3½ inch diameter front Lenses which can be either an 8-in., 9-in., 10-in., 12-in., 14-in., or 18-inch focus lens, mounted in brass tubes, sliding into a substantial rackwork mount, with double pinions. Complete with 'Jubilee' Hand-Feed Arc Lamp in case, all best quality.



This Lantern is all that is desired for showing slides in large halls at long distances where the electric current is available.

Price, **£18 10s.**

No. 2 ditto, cheaper form, Mahogany Body, Brass Front, &c., similar to Illustration, complete with Arc Lamp, with 2-inch diameter Lenses and 4-inch Condensers, **23 3s.**



Hughes' SPECIAL BIUNIAL

With Solid Brass Telescope Draw Tubes, and three sets of first-class Lenses, double combinations for different distances.

Price **£13 13s.** (net price).

This is the greatest value ever offered.

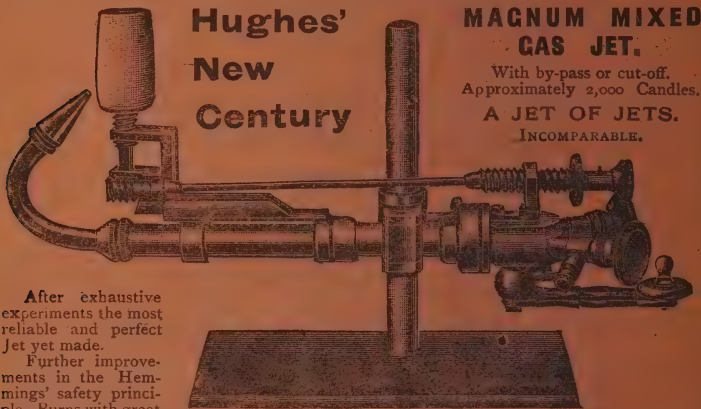
Handsome polished Mahogany body (lined with iron), 4-inch Condensers, elegant solid brass fronts, registering screws, diaphragm shutter for rolling curtain effect, Malden dissolving tap, and two blow-through safety jets.

£13 13s.

With 4-inch Condensers, **£14 14s.**

Triples, **£20 10s.** and **£22 10s.**

Mahogany Brass-fronted Biunials, **£7 10s.** and **£6 10s.** (Cheapest and Best Extant.)



Hughes' New Century

MAGNUM MIXED GAS JET.

With by-pass or cut-off. Approximately 2,000 Candles.

A JET OF JETS.

INCOMPARABLE.

After exhaustive experiments the most reliable and perfect Jet yet made.

Further improvements in the Hemmings' safety principle. Burns with great ease.

The most powerful and brilliant Light. Perfect Combustion. The Gases cannot burn back, having special safety chambers, therefore less liable to reflex action.

A pure white light suitable either for an Ether Saturator or gases under pressure.

A MAGNIFICENT JET.

BEAUTIFULLY FINISHED.

Scientifically constructed, giving finest results. Price, including tray and substantial lime turner, **£3 10s.**

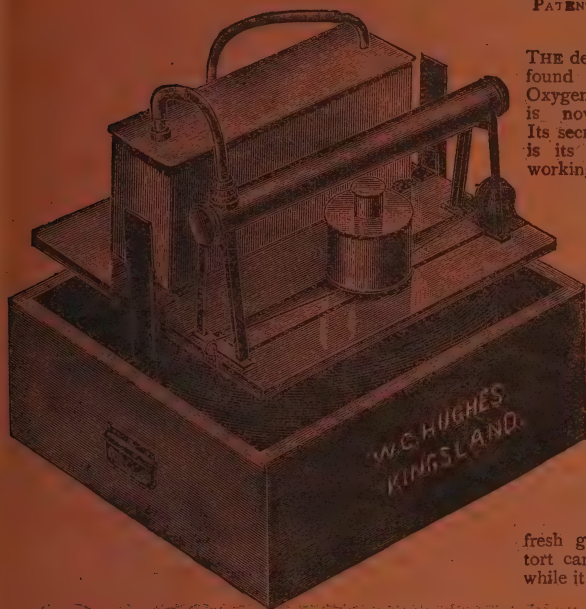
Ditto, without cut-off, **£2 10s.**

W. C. HUGHES, Specialist in Optical Projection,
BREWSTER HOUSE, 82, MORTIMER ROAD, KINGSLAND, LONDON, N.

ESTABLISHED OVER 30 YEARS.

HUGHES' SIMPLEX OXYGEN GENERATOR.

PATENT APPLIED FOR



THE defects hitherto found in many Oxygen Generators is now remedied. Its secret of success is its simplicity in working. Simplicity is always perfection. No complicated parts. Automatic release. No steel springs to rust. No machinery to carry or release lamp. Separate retorts done away with.

Filled in a few minutes, and, if required, a fresh generating retort can be replaced while it is working.

NOTE.—The Lamp is detachable from the chain, an important feature of this invention. Should the automatic chain that carries the lamp by any means go wrong (which is not at all likely), with this arrangement the lamp can be moved higher up the tube by hand, where a fresh part can be exposed to its heat, and so go on generating the gas. No failure can arise.

Price complete - - £6.

The only perfect Oxygen Gas Generator extant.

This used with one of Mr. Hughes' Safety Ether Saturators will, with a properly constructed jet, give a light equal to 2,000 candle power.

W. C. HUGHES, Specialist in Optical Projection

(THIRTY YEARS' REPUTATION),

Brewster House, 82, Mortimer Road, Kingsland, London, N.

HUGHES' PATENT BIJOU

ENLARGING LANTERN*Still holds its own for perfection in results and workmanship.***Rectangular Condensers the size of Negative.****Portability, Perfection, and Rapidity. Splendid Results.****Superior Marginal Definition.****Particulars Free.**

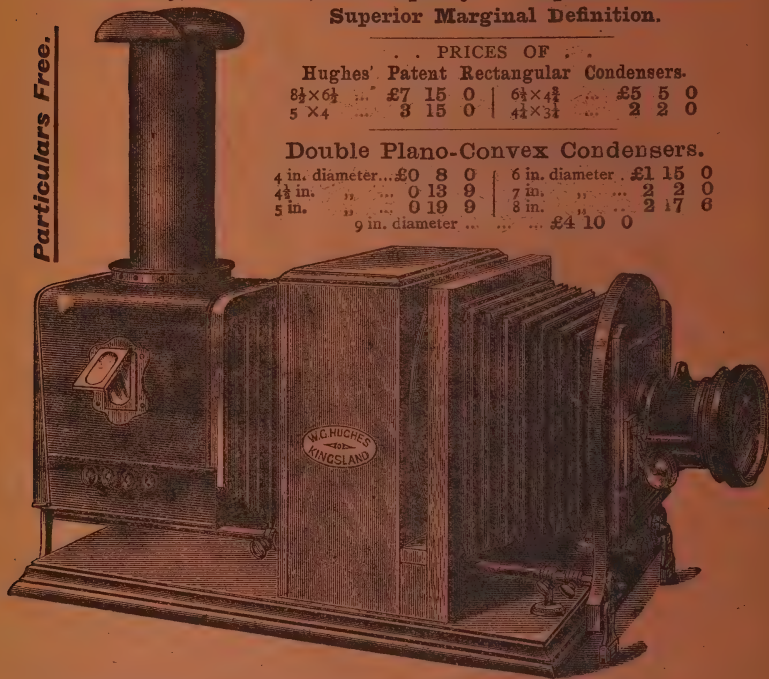
PRICES OF

Hughes' Patent Rectangular Condensers.

8½ × 6½ ...	£7 15 0	6½ × 4½ ...	£5 5 0
5 × 4 ...	3 15 0	4½ × 3½ ...	2 2 0

Double Plano-Convex Condensers.

4 in. diameter ...	£0 8 0	6 in. diameter ...	£1 15 0
4½ in. " ...	0 13 9	7 in. " ...	2 2 0
5 in. " ...	0 19 9	8 in. " ...	2 17 6
9 in. diameter ...	£4 10 0		



The only Perfect Enlarging Lantern for results. Fitted with Hughes' new pattern Pamphengos Lamp. Slide Holder arranged to suit parts of the larger sized Negatives. The body and front lens extend by means of solid brass tubes.

NO PHOTOGRAPHER SHOULD BE WITHOUT ONE.

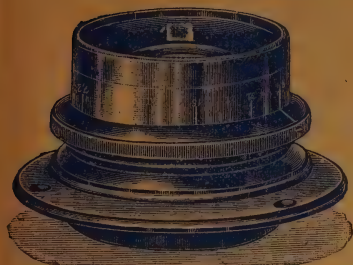
Instead of Circular Condensers, Rectangular or Square, reduces the Lantern considerably in size, and gives finer definition than any other. Perfect combustion and a pure white light. This instrument is scientifically constructed, and is not the commercial article made of Russian iron, &c., sold for cheapness. For high-class work it stands alone. 8½ × 6½, £21. 6½ × 4½, £14 14s. 4½ × 3½, £7 15s. 5 × 4, £3 15s.

W. C. HUGHES, Brewster House, Kingsland, London, N.
82, Mortimer Rd.

The Simon Anastigmat Lens.

Manufactured by OSCAR SIMON, Dresden.

ESTABLISHED IN POTSDAM 1876.



F/72.

Angle 90°

A PERFECT LENS. Perfect in quality, definition, and covering power. These Lenses are made of the finest selected Jena glass, and the combinations being symmetrical are perfectly free from distortion. They are completely corrected for astigmatism, and curvature of the field has been entirely eliminated. They are characterised by their intense brilliancy, great depth of focus, and extreme covering power. They give exquisite definition at F 7.2 over the whole surface of the plate they are sold to cover, and when stopped down they are converted into wide-angle lenses of at least twice the covering power. As an example of this, the No. 1 at F. 7.2 covers quarter-plate, at F. 12.5 half-plate, and F. 32 whole-plate.

A PERFECT UNIVERSAL LENS FOR PORTRAITS, LANDSCAPE, ARCHITECTURE, AND COPYING.

No.	Equivalent Focus.	Plate covered F. 7.2	Plate covered F. 12.5	Plate covered F. 32	With Iris Diaphragms	Mounted in Focussing Jacket
00	4 1/2 ins.	2 1/2 x 3 1/2	3 1/2 x 4 1/2	4 1/2 x 6 1/2	£2 10 0	£2 17 6
0	5 1/2 "	3 x 4	3 3/4 x 4 3/4	6 x 8 1/2	2 15 0	3 2 6
1	5 3/4 "	3 1/4 x 4 1/4	4 x 5 1/4	7 x 9 1/4	3 0 0	3 7 6
2	7 1/2 "	4 1/4 x 6 1/4	5 1/4 x 7 1/4	9 x 11 3/4	3 15 0	4 2 6
3	9 1/2 "	5 1/4 x 7 1/4	6 1/4 x 8 1/4	11 1/4 x 13 1/4	5 0 0	—
4	12 1/2 "	6 1/2 x 8 1/2	7 x 9 1/2	15 1/2 x 19 1/2	7 0 0	—
5	15 1/2 "	8 1/2 x 9 1/2	9 1/2 x 11 1/2	19 1/2 x 23 1/2	10 0 0	—
6	19 "	9 1/2 x 11 1/2	11 1/2 x 15 1/2	23 1/2 x 27 1/2	14 10 0	—

Convertible Sets of - Anastigmatic Lenses



1/2-Plate covering up to 15 x 12 Plate, £ 6 10/-

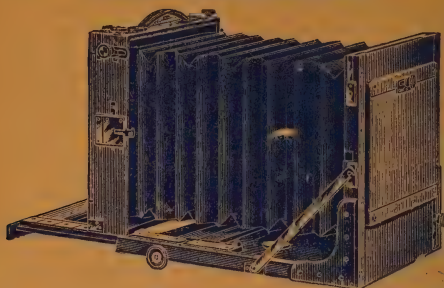
1/4-Plate covering up to 24 x 20 Plate, £10 10/-

HORA & Co., Photographic Chemists,

346, YORK ROAD, WANDSWORTH, LONDON.

Telegrams—Hora, Wandsworth, London. Telephone 280 & 327, Battersea.

The "Professional" Fairfield Camera.



**For Studio
or Field.**

Brass Bound. . . .

Every Modern
Improvement.

With sliding panel,
giving extreme rise
and fall to front.

THIS is an excellent form of Camera, and suitable alike both for Studio and Field. It is solidly made, Brass bound all over, and the front is constructed to take large heavy lenses. It has double swing back, leather bellows, rising, falling and cross fronts, reversing back, and long extension with rack and pinion. Each Camera has three Brass-bound double book-form Slides, fitted with every modern improvement. The interior of the Camera is fitted with a moving panel, which allows an extreme rise and fall to the front, which in the Whole-plate size amounts to a 3in. rise and a 3in. fall.

PRICE (with 3 Brass-bound Slides);—

6½ × 4½	...	...	...	...	...	£4 15 0
8½ × 6½	...	...	...	...	...	5 12 6
10 × 8	...	...	...	...	...	7 7 0
12 × 10	...	...	...	...	...	9 9 0
15 × 12	...	...	...	...	...	13 13 0

Complete ½-Plate Outfit

Comprising ½-plate Brass-bound Professional Fairfield Camera, Three Brass-bound Slides, Emil Busch No. 2 Rapid Aplanat Lens, Three-fold rule joint sliding leg tripod with 3 ply mahogany head and Roller Blind Shutter with speed indicator and time exposure brake, giving exposures from $\frac{1}{100}$ of a second, to 3 seconds, and time at will.

£6 15s. Od.

Complete 1-Plate Outfit

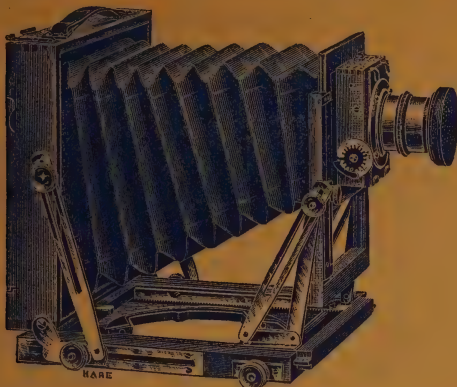
Comprising 1 Brass-bound Professional Fairfield Camera, Three Brass-bound Slides, Emil Busch No. 3 Rapid Aplanat Lens, Three-fold rule joint sliding leg tripod, with 3 ply mahogany head and Roller Blind Shutter with speed indicator and time exposure brake, giving exposures from $\frac{1}{100}$ of a second, to 4 seconds, and time at will. **£8 Os. Od.**

HORA & Co., Photographic Chemists,

346, YORK ROAD, WANDSWORTH, LONDON.

Telegrams—Hora, Wandsworth, London. Telephone 280 & 327, Battersea.

The Fairfield 70/- $\frac{1}{2}$ -plate Outfit.



THIS Camera is splendidly made of fine polished mahogany, is fitted with every movement and modern improvement and is capable of performing the work of the most expensive apparatus, with which it will compare favourably both in appearance and finish. It has best leather bellows, rising, falling, double swing and panel fronts, double swing-back, side swing, reversing and wide angle back, very long double extension and good turn-table in base. The slide is of first-class quality, strong yet light, made of mahogany, double book-form, with special light tight joints to shutters, spring catches and hinged zinc division between plates, keeping them in focus. The lens is an excellent quality, **Double Achromatic Rapid Rectilinear**, working at F 8, fitted with Iris diaphragms and removable Hood, made by one of the Best Parisian Lens Makers. The Shutter is a new patent one, having winding wheel to set it, giving exposures from $\frac{1}{100}$ of a second to three seconds, and time exposures at will. It is fitted with removable panel allowing other lenses to be used on the same shutter and speed indicator. The stand is of polished ash, three-fold with sliding leg and stretchers. **The camera case is perfect;** stiff all over allowing plenty of room for a complete outfit, Green Baize lined and forms a splendid protection for one of the most up-to-date outfits ever offered for the money.

Price 70/- Complete.

Extra Double Slides 7/6.

$\frac{1}{4}$ -Plate Outfit complete with carrying case and rule joint tripod

£5 5s. 0d. Extra Slides 12/6.

Half-plate outfit with Emil Busch No. 2 Rapid Aplanat Lens, **£4 10 0.**

Whole-plate Outfit with Emil Busch No. 3 Rapid Aplanat Lens, **£6 7 6.**

HORA & Co., Photographic Chemists,
346, YORK ROAD, WANDSWORTH, LONDON.

Telegrams—Hora, Wandsworth, London. Telephone 280 & 327 Battersea.

THE FAIRFIELD Roller Blind Shutter,



WITH SPEED INDICATOR.
TIME & INSTANTANEOUS.

Before and Behind Lens
Pattern same price.

A perfect Shutter working
without vibration.

Reasonable in Price.

Guaranteed Perfect.

Sent on approval
against Cash.

WITH SPEED INDICATOR—
FROM
10/6.

FOR LENS HOODS—

$1\frac{1}{2}$, $1\frac{3}{8}$, and 2 in., 10/6
2 $\frac{1}{2}$ in., 13/-
2 $\frac{3}{4}$ in., 14/-
3 $\frac{1}{4}$ in., 18/-
3 $\frac{1}{2}$ in., 20/-
3 $\frac{3}{4}$ in., 22/6

Stereoscopic Time and Instantaneous Shutter

With Speed Indicator, Before or Behind Lens Pattern,



18/-



GUARANTEED SATISFACTORY, AND SENT ON APPROVAL.

Extract from "The Year Book of Photography."

"The 'Fairfield' Cameras have always been favourites of ours, and we must confess that we like the new 'Professional' the best of all. It is an excellent form of Camera, suitable for all kinds of work; it has all the modern improvements, and is brass-bound all over. The front is made extra strong, and large heavy lenses can be used as easily as light ones; the front also has a sliding panel inside which gives extreme rise and fall; the back has a double swing, and the bellows are of good leather."

HORA & Co., Photographic Chemists,
346, YORK ROAD, WANDSWORTH, LONDON.

Telegrams—Hora, Wandsworth, London. Telephone 280 & 327, Battersea.

The Fairfield Hand Cameras.

8/3 A Camera at **8/3** holding 6 $\frac{1}{2}$ plates in sheaths, Wood Body covered in Waterproof Keratol Leather, Two Finders, reliable changing for plates, time and instantaneous shutter and a good lens. **8/3.**

9/3 The same Camera fitted to take 12 plates in sheaths. **9/3**



The Fairfield Guinea Camera.

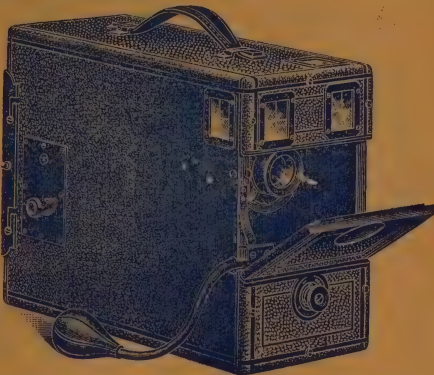
This Camera has been entirely remodelled and improved, and absolutely perfect in all details. The lens is an Achromatic Single Lens with Iris diaphragms. Shutter ever set with six different speeds. Perfect Changing Arrangement with plate indicator, covered in Waterproof Keratol Leather, and Two Brilliant View Finders, double lens, giving view correct way up.

21/-

The Fairfield R.R. Camera.

Fitted with Open Front, Focussing to Scale, Covered in Leather, Double Achromatic Iris R.R. Lens, Bausch and Lomb Shutter, Pneumatic Release, Double Lens Brilliant View Finders giving view correct way up, and a new and perfect changing system.

45/-

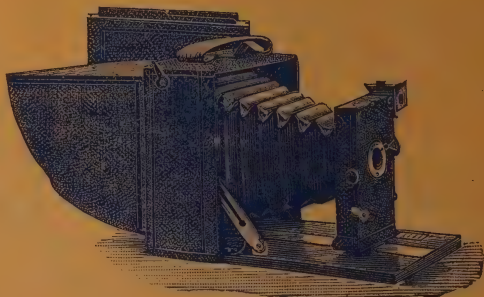


HORA & Co., Photographic Chemists,
346, YORK ROAD, WANDSWORTH, LONDON.

Telegrams—Hora, Wandsworth, London. Telephone 280 & 327, Battersea.

Fairfield Folding Pocket $\frac{1}{4}$ -Plate Camera.

A POCKET Hand Camera designed on the lines now so popular in American Cameras. It is light, compact, neat and effective. Complete with Good Single Achromatic Lens, Stops, Time and Inst. Shutter, reversible View Finder, Focussing Scale and one Double Slide.



$3\frac{1}{4} \times 4\frac{1}{4}$ 19/6 $3\frac{1}{4} \times 4\frac{1}{4}$

The same Camera in 5×4 size with adjustable speeds to Shutter complete with one slide, **£1 1s. 0d.**

Extra Slides $\frac{1}{4}$ -Plate ... **2/6** each.

5×4 plate ... **2/9** each.

Fairfield No. 1 Daylight Loading Film Camera, $4\frac{1}{4} \times 3\frac{1}{4}$.



This Camera combines portability, lightness, strength and utility, and a popular standard sized picture at a moderate price. It has a specially selected achromatic lens with stops, focussing scale, instantaneous shutter with variable speeds, and giving time exposures at will. The finder is a reversible brilliant double lens finder, giving the view correct way up. It is made to take roll films,

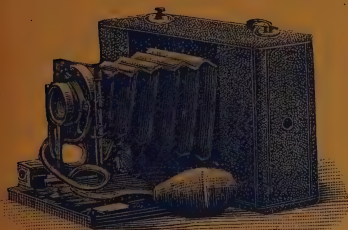
and fitted so that pictures of the following two sizes can be taken in it, $4\frac{1}{4} \times 3\frac{1}{4}$ and $3\frac{1}{4} \times 3\frac{1}{4}$.

Price 30/-

HORA & Co., Photographic Chemists,
346, YORK ROAD, WANDSWORTH, LONDON.

Telegrams—Hora, Wandsworth, London. Telephone 280 & 327, Battersea.

The Fairfield No. 2 Daylight Loading Film Camera, $4\frac{1}{4} \times 3\frac{1}{4}$.



THIS Camera is the same as the No. 1 only of superior style and finish fitted with a **High Class Rapid Rectilinear Lens and Iris Diaphragm**, with rising and falling front and between lens, Bausch and Lomb Shutter giving time, inst. and bulb exposures of variable speeds, Scale for focussing, Double lens, non-reversing brilliant finder and pneumatic release. It is made to take roll films and fitted so that

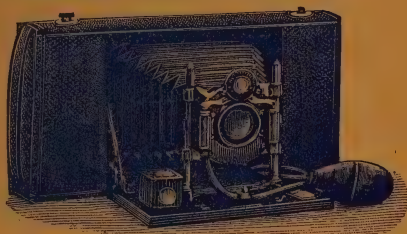
pictures of the following two sizes can be taken with it, $4\frac{1}{4} \times 3\frac{1}{4}$ and $3\frac{1}{4} \times 3\frac{1}{4}$.

£2 12s. 6d.

The Fairfield No. 3 Daylight Loading Film $4\frac{1}{4} \times 3\frac{1}{4}$ Camera.

This is precisely the same as the No. 2 only fitted with Bausch and Lomb Unicum Shutter, giving exposures from $\frac{1}{100}$ second to 1 second, and time exposures at will. It is made to take Roll Films $4\frac{1}{4} \times 3\frac{1}{4}$ and $3\frac{1}{4} \times 3\frac{1}{4}$.

£3 7s. 6d.



Tripods.

$\frac{1}{2}$ -Plate 3-fold polished ash, with sliding leg straps and solid ash head	5/6
$\frac{1}{4}$ -Plate 3-fold polished ash, with rule joint, sliding leg and two ply mahogany head	8/6
$\frac{1}{2}$ -Plate 3-fold polished ash, with rule joint, sliding leg and three ply mahogany head	12/6

The Hercules Fairfield Tripod

will take any Camera up to 12×10 . Four fold weight 72 ozs. including head, measures $17\frac{1}{4}$ inches long when closed.

The Acme of Perfection for the Professional or the Amateur.

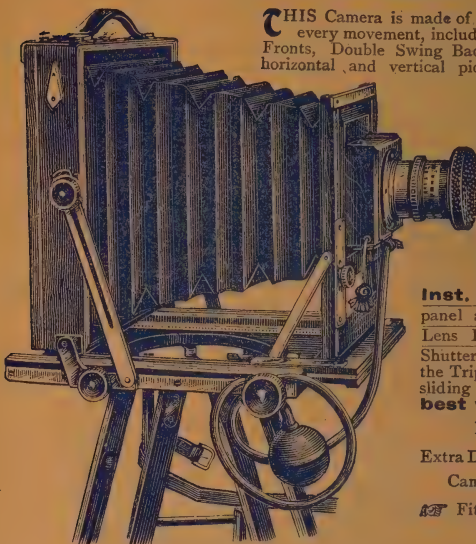
Price **27/6.**

HORA & Co., Photographic Chemists,

346, YORK ROAD, WANDSWORTH, LONDON.

Telegrams—Hora, Wandsworth, London. Telephone 280 & 327, Battersea.

The Fairfield 52/6 Half-Plate Outfit, With Turntable.



THIS Camera is made of Fine Polished Mahogany with every movement, including Rising, Falling, and Panel Fronts, Double Swing Back and Reversing Frame for horizontal and vertical pictures. The back moves forward for use with wide-angle Lenses, and the base-board has rack-and-pinion adjustment, and is fitted with turntable. The Lens is a Double Achromatic Iris Rapid Rectilinear of the best quality. The Dark Slide is double book form with spring catches and hinged division between plates and rabbetted joints to shutters. The Shutter is a Roller Blind **Time and**

Inst. Shutter with removable panel and Speed Indicator behind Lens Pattern, or before Lens 2-in. Shutter can be had if desired, and the Tripod is 3-fold polished ash with sliding leg. It is unquestionably the **best value offered.**

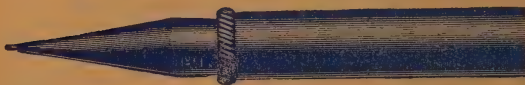
Half-Plate 52/6 Nett.

Extra Double Slides, Book Form, 7/6.

Camera and Slide only, 30/-

AT Fitted with Busch No. 2 Rapid Aplanat Lens 75/-

1/6



1/6 each.

3/9



3/9 each.



3/6

Tipped duplex feed and silver spiral to regulate flow of ink, 3/6 each.

The cheapest and best fixed needle stylo pen made. The points and needles are made of Platinum & Iridium. Complete in box with filler.

Spring needle stylo, best quality. Handsomely engraved barrel, great ink capacity, with broad milled bead to secure strong grip for the fingers, also making it pleasant to write with.

The very finest value ever offered. Best quality Fountain Pen, handsomely engraved Barrel, fitted 14 carat **Gold Nib**, Iridium

HORA & Co., Photographic Chemists,
346, YORK ROAD, WANDSWORTH, LONDON, S.W.

Telegrams—HORA, Wandsworth, London. Telephone 280, & 327 Battersea.

OPALINE GLASSES, Backs and Boxes. . .

Medallion View Materials, Plush Blocks,

PLATE GLASS CUTTING SHAPES,

VIGNETTING GLASSES.

Finely Ground Glass for Focussing Screens,

Graduated Measures,

OPAL GLASS, POSITIVE GLASS, COLOURED GLASS.

GLASS DISHES.

Moores, DeSaulles & Co.



WORDSLEY,

near **STOURBRIDGE.**

SILVERED GLASS.

MAGIC LANTERN COVER GLASS,

MICROSCOPICAL GLASS SLIDES,

MICROSCOPICAL GLASS COVERS.

POLISHED PLATE GLASS for ENAMELLING.

Glass Photo Frames.

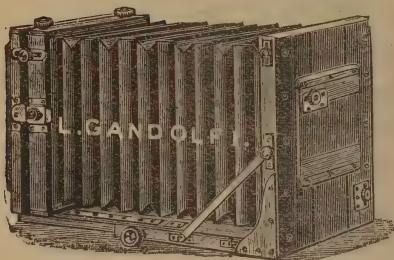
We supply the Trade Only. Send Trade Card for Price List.

Dealer.' Orders of £2 net value carriage paid to any station in England and Wales; £5, Scotland and Ireland. £ 2

LOUIS GANDOLFI,

Manufacturer of Photographic Apparatus,
752, OLD KENT ROAD, LONDON, S.E.
(Near L. B & S. C. Rly. Station). Est. 1885.

The Universal Camera.

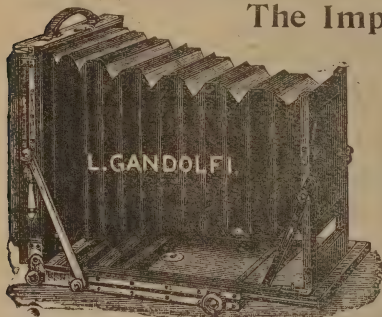


DESIGNED for photographers who require a camera to do all-round practical work, studio and outdoor. Has double swing, reversible back, rise and crossfront, parallel leather bellows, double extending rack-work to focus. A $\frac{1}{2}$ -plate will focus with the rack and pinion from $3\frac{1}{2}$ in., and extends to $19\frac{1}{2}$ in. Side rule hinges and brass brackets to base. When set up is very rigid throughout. The $\frac{1}{2}$ -plate and whole-plate sizes are fitted with a movable division for stereo work. It is the best pattern for stereo and telephoto work. From 10×8 and upwards the crossfront has flush lens panel inserted. Two lens boards are sent out with each camera. The slides are book form, and have overlap hinge joints to shutters, spring catches, hinged divisions, and ivory numbers. Best London workmanship and finish. The wood is thoroughly well seasoned Honduras mahogany.

Price for Camera and Three Slides.

		Brass binding.	Extra slides.	Brass binding.
Half-plate	£4 14 0	22/-	8/6	3/-
Whole-plate	6 4 0	25/-	13/6	3/6
10x8	8 4 0	30/-	18/-	4/3
12x10	10 14 0	35/-	24/-	4/9
15x12	14 14 0	42/-	33/-	5/-

The Imperial Camera.



DESIGNED for architectural and ordinary work. Made of thoroughly well seasoned mahogany. Has an extra high-rising front, double swing reversible back, swing front, leather bellows, double extension, rack and pinion to focus, catch to hold slide in position. The lens should be fitted nearer one end of the lens board, as marked, and then centred for high rise; for extra fall reverse the lens board. The back can be brought forward for short-focus lens. A half-plate will focus from $3\frac{1}{2}$ to 15, in weight 3 lbs. The slides are the same as supplied with the Universal. Is a very handsome finish. The slides drop in and slide

Camera when set up. Best London workmanship and finish. The slides drop in and slide about an inch, and are fixed with catch.

Price of Camera and Three Slides.

		Brass binding.	Extra slides.	Brass binding.
Half-plate	£4 0 0	20/-	8/6	3/-
Whole-plate	5 8 0	23/-	13/6	3/6
10x8	7 5 0	27/-	18/-	4/3
12x10	9 0 0	31/-	24/-	4/9
15x12	12 16 0	37/-	33/-	5/-

Liberal Discount to Dealers. Send for Price List.

BUSCH'S APLANATS

AND OTHER LENSES CAN BE

Obtained from all Photographic Dealers,

*The largest Houses holding a Stock of the most
important Series.*

Photographers have now satisfied themselves that, notwithstanding the low prices, the Lenses are of the finest quality, and that our claim to supply "Standard Quality Lenses at the lowest possible prices" has been fulfilled. The Factory having been established in 1800 has the accumulated experience of 100 years to aid them in turning out the very best optical work at the least possible cost.

All the principal series of Lenses are now fitted with the Royal Photographic Society's Standard Thread Flanges.

SEE NEW ANASTIGMATS.

BUSCH'S WIDE ANGLE APLANAT.

F 16,
Angle, 100 to 105°.

THIS new Series of Wide Angle Lenses has been constructed in a portable form to give great illumination combined with a very extensive field of view. They are absolutely free from distortion and other optical defects. The relative short focus makes them specially suitable for the taking of high and broad objects at a short distance, such as Architecture, Interiors and Panoramic Views.



No.	Focus. Inches.	Med. Diaphragm.	Covering Plates		Circle of covering with smallest Diaphragm has diameter Inches.	Price		
			With smallest Dia- phragm giving equality of illumina- tion over the whole surface of plate.			£	s.	d.
1	4½	4½ × 3½	7 × 5	12	1	8	0	
2	6	7 × 5	9 × 7	16	1	12	0	
3	7½	9 × 7	12 × 10	20	2	11	0	
4	9½	12 × 10	16 × 12	34	3	5	0	

SOLE REPRESENTATIVE AGENT:

HENRY F. PURSER, 31, Hatton Garden, LONDON, E.C.

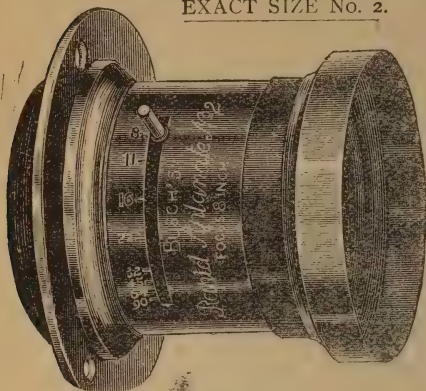
[See following pages.]

BUSCH'S APLANATS.

EXACT SIZE No. 2.

RAPID APLANAT.

F 8. ANGLE, 75°.



THIS is a series of very fine Rectilinear Lenses of Symmetrical Construction; therefore quite free from distortion, consisting of two Achromatic Combinations, optically corrected. Aided by the specially tested Jena Glass, with the peculiar nature of the curves, it has been possible to produce in a mount nearly half the size of the ordinary French and English models, a lens which covering well at full aperture will, when stopped down, give a brilliant picture two or three sizes larger, thus becoming a Wide Angle Lens when used on a larger size plate.

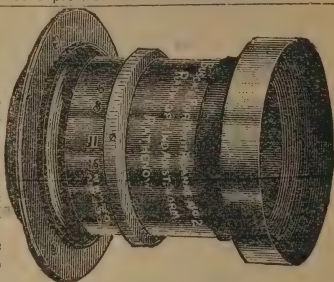
No.	Focus. Inches.	Covers Plate.	Smaller- Diaphragm.	Price with Iris D'aphragm.	Price with Water- house Diaphragm.
1	6	4½ × 3½	8½ × 5½	£1 10 0	£1 5 0
2	8	6½ × 4½	8½ × 8½	1 13 0	1 8 0
3	10	8½ × 6½	12½ × 10½	2 5 0	2 0 0
4	12	12 × 10	16 × 12	3 0 0	—
5	18	14 × 11	20 × 16	4 5 0	—
6	24	15 × 12	24 × 20	8 15 0	—

Nos. 1 and 2 can be had paired for Stereoscopic work at extra charge of 5/-

PORTRAIT APLANAT.

F 6. ANGLE 65°.

AN entirely new construction of Portrait Lenses especially designed for Studio work and Instantaneous effects. The Lenses are of large aperture, admitting of much light and giving a brilliant picture. Aided by the specially tested Jena Glass, the construction is such as to give a very flat field and perfect definition over the whole surface of the plate at full aperture. They are of symmetrical construction, absolutely free from distortion, and can be used also with great advantage for all general purposes, such as Copying, Enlarging, Interiors, &c.



No.	Diameter of Lenses.	Equivalent Focus.	Covers at full Aperture.	With smaller Diaphragm.	Price, Iris Diaphragm.
1	3 ins.	5 ins.	3½ × 2½	4½ × 3½	£1 15 0
2	1½ "	7 "	4½ × 3½	7 × 5	2 7 6
3	1½ "	11 "	7 × 5	9 × 7	3 3 0
4	2½ "	14 "	9 × 7	12 × 10	4 4 0
5	3 "	18 "	10 × 8	15 × 12	9 5 0

SOLE REPRESENTATIVE AGENT:—

HENRY F. PURSER, 31, Hatton Garden, LONDON, E.C.

[See preceding and following pages.]

BUSCH'S DETECTIVE APLANATS.

Nos. 1 & 2, F 6. No. 2½, F 6·5. No. 3, F 7.
Angle 70°.

SERIES A.

A NEW Series of Jena Glass Lenses specially constructed for Hand Camera and Stereoscopic work. The greatest care is exercised in the grinding of the deep curves which characterise this, as also the Rapid Aplanat series, in order to secure perfect freedom from optical defects.

Working at a larger aperture, and being shorter in focus than the Rapid Aplanats they are specially recommended for Hand Camera use.

Two Series are made, A and B, mounted in oxydised brass. Series A are for use on Cameras that have a focussing adjustment.

No.	Diameter of Lenses.	Equivalent Focus.	Covers at full Aperture.	With smaller Diaphragm.	Price.
1	... ¾ ins.	... 4 ins.	3½ × 2½ ins.	4½ × 3½ ins.	£1 5 0
2	... ¾ ins.	... 5 ins.	4½ × 3½ ins.	6 × 4½ ins.	1 10 0
2½	... 1 1/16 ins.	... 6½ ins.	5 × 4 ins.	7 × 5 ins.	1 15 0
3	... 1 1/8 ins.	... 7 ins.	6 × 4 ins.	8½ × 5½ ins.	1 15 0

Nos. 1 and 2 can be had paired for Stereoscopic work at extra charge of 5/-.

Nos. 1 & 2, F 6. No. 2½, F 6·5.
No. 3, F 7. Angle 70°.

SERIES B.

THE Lenses of this Series are the same as Series A, but are mounted for use on cameras that have not a focussing adjustment. They are fitted with a helical movement, and a scale is engraved on the mount showing the adjustment necessary to bring into focus objects at different distances.

Flanges and other parts of mounting are made of aluminium, in order to lessen the weight.

No.	Diameter of Lenses.	Equivalent Focus.	Covers at full Aperture.	With smaller Diaphragm.	Price.
1	... ¾ ins.	... 4 ins.	3½ × 2½ ins.	4½ × 3½ ins.	£2 2 0
2	... ¾ ins.	... 5 ins.	4½ × 3½ ins.	6 × 4½ ins.	2 7 6
2½	... 1 1/16 ins.	... 6½ ins.	5 × 4 ins.	7 × 5 ins.	2 12 0
3	... 1 1/8 ins.	... 7 ins.	6 × 4 ins.	8½ × 5½ ins.	2 12 0

Nos. 1 and 2 can be had paired for Stereoscopic work at extra charge of 5/-, or paired and fitted with simultaneous focussing adjustment.

Mounted on Aluminium Plate, 18/- extra; Brass Plate, 16/- extra.

SOLE REPRESENTATIVE AGENT:—

HENRY F. PURSER, 31, Hatton Garden, LONDON, E.C.

[See preceding and following pages



.. Busch's Lenses ..

"VADE MECUM" SETS.

D.R.G.M. 110275 & 6.

Improved Series with 3 optically worked Orthochromatic Screens, 2 Correcting Lenses, Royal Photo Society's Standard Thread Flanges. No. 1 consists of 4 and No. 2 of 7 single Lenses, which used singly and in combination give respectively 14 and 29 different foci of Rectilinear, Wide Angle, and Landscape Lenses. The addition of the Screens and Correcting Lenses, with a movement enabling them to be used between the Lenses in combination, makes this the most complete set ever offered to the public, and offers facilities to the most exacting artist for every kind of work.

Full Table of Combination and F values supplied with each set.

Full particulars in Complete List.



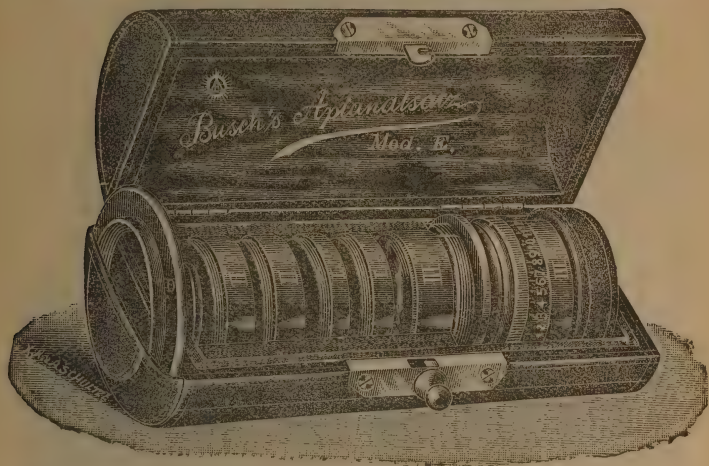
- | | |
|---|---------------------------|
| <p>No. 1—Consisting of 4 Lenses giving 14 Combinations; 5 Wide Angle, 5 Ordinary Angle, and 4 Landscape Lenses, with 2 special mounted Lenses for the correction of differences between chemical and optical focus, and 3 optically worked plane coloured Screens for Orthochromatic Phot. graphy, &c.</p> | <p>£2 19s. 6d.</p> |
| <p>No. 2—Same as above but with 7 Lenses giving in all 29 Combinations. Focal lengths from 4 inches to 30 inches</p> | |

SOLE REPRESENTATIVE AGENT—

HENRY F. PURSER, 31, Hatton Garden, LONDON, E.C.

[See preceding and following pages.]

Busch's Aplanat Sets, *f* 8.



THESE sets consist of our Aplanat Series of Lenses, Nos. 1, 2, and 3, mounted interchangeably to fit one mount. The various Lenses give, in combination and singly, nine different foci, ranging from 6 to 20 inches. The Lenses being fully corrected, a larger working aperture is secured than that given by the "Vade Mecum" Sets.

Price £4 15 0

Stereoscopic Set.

Price £5 10 0

Consists of the same series of lenses as above, but each single lens of same focus exactly paired.

Two lens bodies are supplied, and two flanges.

SOLE REPRESENTATIVE AGENT:—

Henry F. PURSER, 31 Hatton Garden, LONDON, E.C.

[See preceding and following pages.]

Busch's Aplanat Shutter Sets.

F 8.



THESE Sets consist of our Aplanat Lenses, mounted in Cells to fit interchangeably to the "Unicum" Shutter, which has time and instantaneous movements from 1 to 100th of a second, with pneumatic and finger release. The Shutter works between the Lenses, and the Iris diaphragm forms part of the Shutter mount. Three models are made, giving Lenses singly and in combination of 5 to 8 different foci.

Models A and B are useful for Cameras of $\frac{1}{4}$, 5×4 , and $\frac{1}{2}$ -Plate sizes.

Model C for Cameras up to Whole-plate size.

Each Set is neatly fitted into a brown leather covered case, easily carried in the coat pocket.

A card, giving tables of combination and F values, given with each Set.

Model A consists of the Unicum Shutter and four Lenses mounted in cells, numbered I. and II. These Lenses in combination give three different foci of 6, 7, and 8 inches; and singly, 12 and 16 inches. Price, complete in case

£4 4s.

Model B consists of the Unicum Shutter and six Lenses, numbered O, I. and II., which, in combination, give foci of $4\frac{1}{2}$, 5 $\frac{1}{2}$, 6, 7, and 8; and singly, 9 $\frac{1}{2}$, 12, and 16 inches.

Price, complete in case

£5 5s.

Model C consists of the large size Unicum Shutter, with six Lenses, numbered I., II., and III., which, in combination, give foci of 6, 7, 8, 9, and 10; and singly, 12, 16, and 20 inches.

Price, complete in case

£5 15s.

SOLE REPRESENTATIVE AGENT:—

HENRY F. PURSER, 31, Hatton Garden, LONDON, E.C.

[See preceding and following pages.]

Busch's Rapid and Detective Aplanats

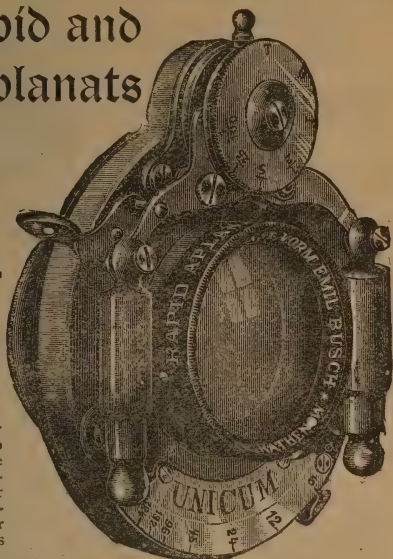
FITTED TO THE

"UNICUM"
SHUTTER.

Rapid Aplanats, F 8.

Nos. 1, 2, and 3.

**Detective Aplanats,
F 6-7.**



THE want of a good quality Lens to replace the cheap ones generally sold with complete cameras, and the consequent necessity of having a shutter giving finer degrees of exposure, has been responsible during the past season for many applications for our Lenses fitted to shutters.

After considering the merits of the various shutters on the market, we have adopted that known as the "Unicum," shown in the above block, which being made of metal offers the advantage that with the shutter working between the combinations, the Lens cells can be screwed to the shutter mount without any fear of their getting out of position as a result of climatic changes.

They give exposures from one to one-hundredth part of a second and time, either being worked by finger or pneumatic release.

RAPID APLANATS WITH SHUTTERS.

No.	Focus.	Covers Plate.	Smaller Diaphragm.	Covering circle with smallest Diaphragm.	Price.
1	6 inches	$4\frac{1}{2} \times 3\frac{1}{2}$	$8\frac{1}{2} \times 5\frac{1}{2}$	9 $\frac{1}{2}$	£2 17 6
2	8 "	$6\frac{1}{2} \times 4\frac{1}{2}$	$10\frac{1}{2} \times 8\frac{1}{2}$	12	3 0 6
3	10 "	$8\frac{1}{2} \times 6\frac{1}{2}$	$12\frac{1}{2} \times 10\frac{1}{2}$	16	3 15 0

DETECTIVE APLANATS WITH SHUTTERS.

No.	Focus.	Covers.	Smaller Diaphragm.	Price.
1	4 inches	$3\frac{1}{2} \times 2\frac{3}{4}$	$4\frac{1}{2} \times 3\frac{1}{2}$	£2 12 6
2	5 "	$4\frac{1}{2} \times 3\frac{1}{2}$	$6 \times 3\frac{1}{2}$	2 17 6
2 $\frac{1}{2}$	6 $\frac{1}{2}$ "	5×4	7×5	3 2 6
3	7 "	6×4	$8\frac{1}{2} \times 6\frac{1}{2}$	3 2 6

SOLE REPRESENTATIVE AGENT:—

HENRY F. PURSER, 31, Hatton Garden, LONDON, E.C.

[See preceding and following pages.]

Busch's "Dantoscop."

Angle 100° to 110°.



THIS is an unrivalled series of Wide-angle Lens constructed by Emil Busch, consisting of two Achromatic Combinations giving an angle of 100° to 110°.

The greatest care is given in working the very deep curves, and they are perfectly free from distortion. For use in confined situations, such as Interiors, Architectural subjects, and Mountain scenery at a short distance, they will be found invaluable.

No.	Diam. of Lenses. Inches.	Equiv. Focus. Inches.	Covers Plate. Inches.	Covering Circle.	Price. £ s. d.
1	...	$\frac{15}{16}$...	$3\frac{1}{2} \times 2\frac{3}{4}$...	$4\frac{1}{2}$...	2 15 0
2	...	$\frac{11}{16}$...	$6\frac{1}{2} \times 3\frac{1}{2}$...	$7\frac{1}{2}$...	3 10 0
3	...	$\frac{11}{16}$...	$9\frac{1}{2} \times 6\frac{1}{2}$...	12 ...	4 15 0
4	...	1 ...	$14 \times 9\frac{1}{2}$...	20 ...	6 0 0
5	...	$1\frac{1}{2}$...	21×14 ...	23 ...	7 10 0
6	...	$2\frac{1}{2}$...	32×21 ...	35 ...	10 0 0
7	...	$3\frac{1}{2}$...	45×32 ...	56 ...	24 0 0

Nos. 1 and 2 can be had paired for Stereoscopic work at extra charge of 5/-.

... Portrait Lenses. ...

PETZVAL FORMULA.

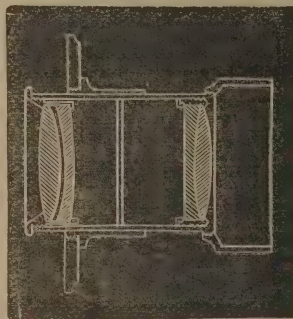
THESE Lenses are constructed after the Petzval formula by Emil Busch in a special manner with the object of securing great light, excellent definition, and a flatter field than is generally obtained by the usual forms of Petzval combination. They are especially suitable for artis ic and general portraiture, and on account of the flatness of field and absence of distortion they can be used very advantageously for the enlargement and reproduction of small pictures.

J. to III. The comparative points of the three series are as follows:—

Series I. has, in proportion to the diameter of objective, the longest focus, least rapidity, greatest definition, and largest picture.

Series II. has somewhat shorter focus, a little less marginal definition, greater rapidity, and smaller picture.

Series III. has the shortest focus, greatest rapidity, least marginal definition, and the smallest picture.

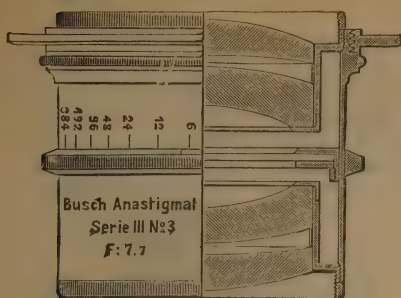


SERIES I. F 4 to 4'5.				SERIES II. F 3'5 to 4.				SERIES III. F 3 to 3'5.			
No.	Equiv. Focus. Ins.	Size Plate. Ins.	Price. £ s.	No.	Equiv. Focus. Ins.	Size Plate. Ins.	Price. £ s.	No.	Equiv. Focus. Ins.	Size Plate. Ins.	Price. £ s.
1 ¹	6 $\frac{1}{2}$	4 \times 3 $\frac{1}{2}$	2 10	1 ²	5 $\frac{1}{2}$	4 \times 3 $\frac{1}{2}$	2 15	2 ³	5 $\frac{1}{2}$	4 $\frac{1}{2}$ \times 3 $\frac{1}{2}$	4 10
2 ¹	8 $\frac{1}{2}$	6 $\frac{1}{2}$ \times 4 $\frac{1}{2}$	4 0	2 ²	7 $\frac{1}{2}$	5 \times 4 $\frac{1}{2}$	4 5	3 ³	6 $\frac{1}{2}$	4 $\frac{1}{2}$ \times 3 $\frac{1}{2}$	5 10
3 ¹	9 $\frac{1}{2}$	6 $\frac{1}{2}$ \times 5	5 0	3 ²	8 $\frac{1}{2}$	5 $\frac{1}{2}$ \times 4 $\frac{1}{2}$	5 5	4 ³	7 $\frac{1}{2}$	5 \times 4	7 0
4 ¹	10 $\frac{1}{2}$	8 \times 6 $\frac{1}{2}$	6 5	4 ²	9	6 $\frac{1}{2}$ \times 4 $\frac{1}{2}$	6 10	5 ³	9	6 $\frac{1}{2}$ \times 4 $\frac{1}{2}$	9 5
5 ¹	12 $\frac{1}{2}$	7 $\frac{1}{2}$ \times 9 $\frac{1}{2}$	8 0	5 ²	11	8 \times 6 $\frac{1}{2}$	8 10				

SOLE REPRESENTATIVE AGENT:—

HENRY F. PURSER, 31, Hatton Garden, LONDON, E.C.

[See preceding and following pages.]



BUSCH ANASTIGMAT LENSES.

SERIES III.

(F 7.7.)

PATENTED IN ALL COUNTRIES.

THE LATEST, BEST, AND LOWEST PRICED MODERN FLAT FIELD LENSES.

In conformity with our established policy, we have in the Busch Anastigmat produced a Lens of the highest quality at the least possible cost.

Scientists and experts during the past fifty years have declared it impossible to correct astigmatism with what are known as normal glasses, consequently the production of Anastigmat Lenses awaited the discoveries of Dr. Schott, in Jena, followed by the production of Crown Glasses of higher refractive index than those normally in use.

Our investigations and experiments, however, have proved that the necessary correction can be made with normal glasses, which have the advantage of being practically free from those defects characteristic of some of the new abnormal glasses, which have a yellowish colour, contain bubbles, &c., and are liable to deterioration by the action of light and atmosphere.

We have thus been successful in producing a true Anastigmat, which we can confidently assert is equal to any of the modern Flat Field Lenses at a price which should appeal to every photographer.

The Busch Anastigmats are characterised by their ability to render sharp and clearly defined images at full aperture to the extreme margin of plate for which they are listed.

They are therefore specially suitable for architectural subjects copying and snapshots in dull lights, when the full aperture can be used and perfect marginal definition secured.

The Busch Anastigmat is composed of two Symmetrical combinations each being corrected for both Spherical and Chromatic aberrations, and astigmatism eliminated. The extreme angle of the Lens is 80 degrees, and over this angle curvature of the field is entirely absent.

Consequent on the Symmetrical construction, there is an absolute freedom from distortion, and a perfectly rectilinear image is produced.

Each combination being fully corrected, the back Lens can be used alone for Landscape and Portraiture, the focal length being about $1\frac{1}{2}$ times that of the complete Lens.

No.	Equiv. Focus.	Diam. of Lenses	R.P.S. Stand'd Flange.	Covering sharp to the edge of the Plate at			Covering Circle with Smallest Diaphragm.
				F 7.7	F 16	F 45	
1	3 $\frac{1}{2}$ "	1 $\frac{1}{2}$ "	1"	3 $\frac{1}{2}$ × 2 $\frac{1}{2}$	4 × 3	4 $\frac{1}{2}$ × 3 $\frac{1}{2}$	6"
2	5 $\frac{1}{2}$ "	2 $\frac{1}{2}$ "	1 $\frac{1}{2}$ "	4 $\frac{1}{2}$ × 3 $\frac{1}{2}$	6 × 4 $\frac{1}{2}$	7 × 5	8 $\frac{1}{2}$ "
2 $\frac{1}{2}$	6"	2 $\frac{1}{2}$ "	1 $\frac{1}{2}$ "	5 × 4	6 $\frac{1}{2}$ × 5	8 × 5	10"
3	7 $\frac{1}{2}$ "	3"	2"	7 × 5	8 × 6	9 × 7	11 $\frac{1}{2}$ "
4	10"	3 $\frac{1}{2}$ "	2 $\frac{1}{2}$ "	9 × 7	10 × 8	12 × 9	15 $\frac{1}{2}$ "
5	13"	4 $\frac{1}{2}$ "	3 $\frac{1}{2}$ "	11 $\frac{1}{2}$ × 9 $\frac{1}{2}$	14 × 12	16 × 12	19 $\frac{1}{2}$ "

.. PRICES ..

No.	MODEL A, In Ordinary Mount. Iris Diaphragm.			MODEL B, mounted with Helical Focussing Movement. Iris Diaphragm.			With "Unicum" Shutter.		
	£	s.	d.	£	s.	d.	£	s.	d.
1	2	10	0						
2	3	0	0	3	15	0	4	7	6
2 $\frac{1}{2}$	3	7	6	4	2	6	4	15	0
3	3	15	0	4	10	0	5	2	6
4	6	15	0						
5	9	15	0						

The smaller sizes can be had paired for Stereoscopic Cameras, extra 5/-
Model B paired and fitted with simultaneous focussing adjustment.—Mounted in Brass Plate, 16/- extra; mounted in Aluminium Plate, 18/- extra.

.. Busch's .. Cinematograph Lenses.

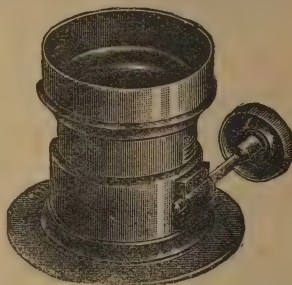
FOR PROJECTION.

A SERIES of first quality Objectives, constructed on the most approved formula for Cinematographs, giving a brilliant and well-illuminated picture with good marginal definition.

In Series I. each Objective is complete with Rack and Pinion mount.

In Series II. the Lenses are supplied mounted in Brass Cylinders or Tubes, and a Brass Rack and Pinion "Jacket" can be had separate.

Each of the sizes is made interchangeable to fit the one Jacket.



No.	Dia. of Lenses. Inches.	Equiv. Focus. Inches.	Enlarging at Distance of			Price—Series I.			Series II.		
			6 Feet.	12 Feet.	18 Feet.	Rack & Pinion.			In Tubes only		
			Times.	Times.	Times.	£	s.	d.	£	s.	d.
1½	... 1¼	... 2	38	76	114	1	13	6	1	5	0
2	... 1½	... 3	26	52	78	1	13	6	1	5	0
3	... 1⅞	... 4	18	36	54	1	15	0	1	8	0
4	... 1½	... 5	15	30	45	1	15	0	1	8	0

Rack and Pinion Jacket for Series II., 12/6.

Busch's Kinematoscope.

FOR PICTURE TAKING. F 4.

A SERIES of Lenses made for Cinematograph Cameras, working at very great rapidity=F. 4. The angle is 52°.

The use of smaller aperture will secure proportionally greater "depth of focus," so that the Lenses can be used for every possible requirement in Cinematograph Picture-taking.

They are mounted in Brass black oxydised, with a focusing jacket and an Iris Diaphragm controlled from the front of the Lens mount.



No.	Diameter of Lenses.	Equivalent Focus.	Covers at F. 4 millimetres.	Price with Iris Diaph. and Focussing Jacket.
1	... ⅜ ins.	... 1⅞ ins.	... 11×13 mm.	... £1 15 0
2	... 1⅞ ins.	... 3⅞ ins.	... 20×25 mm.	... 2 0 0

SOLE REPRESENTATIVE AGENT:

HENRY F. PURSER, 31, Hatton Garden, LONDON, E.C.

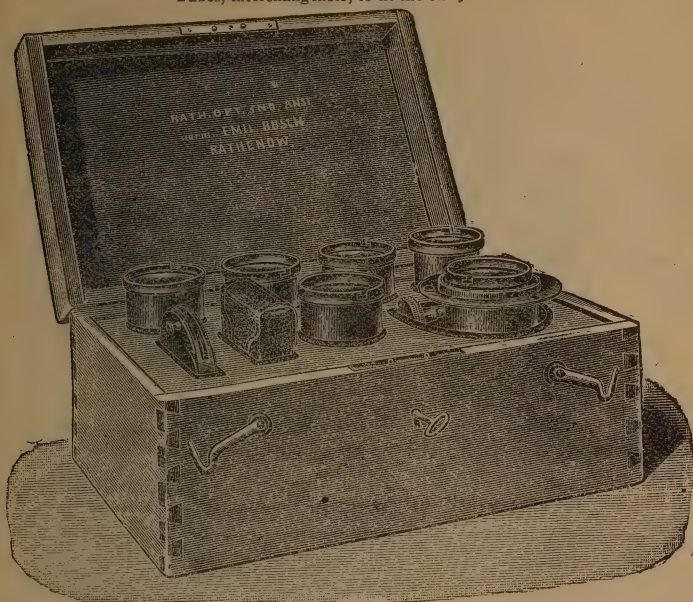
[See preceding and following pages.]

LANTERN LENSES.

Achromatic Projection Objective Set.

For Plates,
 $3\frac{1}{4} \times 3\frac{1}{4}$.

These Lenses are constructed on the Petzval Formula, and mounted in Brass Cylinder Tubes, interchangeable, to fit the one jacket.



The Set consists of the following:—

- 1.—The Brass Jacket, with flange and double rack and pinion. 16/6 each. Extra flange, 3/-
- 2.—Objectives in brass tubes. Lenses, 2 inches diameter. Equiv. focus, 6, 8, 10, 12, 14, and 16 inches, at 16/6 each.
- 3.—Brass top, with flasher and slot for the insertion of coloured glasses, 4/- Made to fit easily to any of the Objectives by means of a bayonet joint.
- 4.—A Set of 6 Coloured Glasses, for projection purposes, consisting of tinted foils mounted between glasses. In leather case, 2/-

The whole set, as shown in block, consisting of Jacket and Flange, 6 Objectives, Top, with Flasher and Coloured Glasses, in Polished Wood Case,

Price 142/- ANY PARTS CAN BE HAD SEPARATELY AT PRICES LISTED.

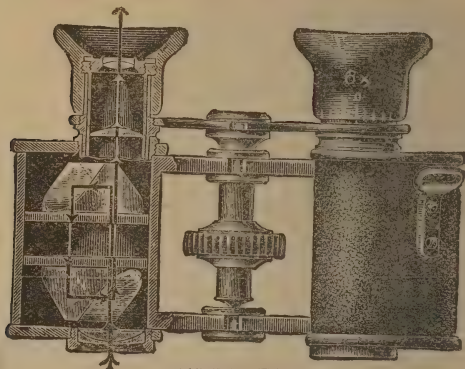
SOLE REPRESENTATIVE AGENT:—

HENRY F. PURSER, 31, Hatton Garden, LONDON, E.C.

[See preceding and following pages

Busch's

Prism Binoculars.



THE lightest and smallest Prism Binoculars made, combining the highest optical qualities with a solid and durable mount.

These Binoculars give a very large field of view, with a well-defined image right up to the edges.

		Weight in Case.		Field of View.	Price.
No. 1,	4 times power	21	ozs.	10° 4'	£6 5 0
„ 2,	6 „ „	23	„	6° 9'	7 10 0
„ 3,	9 „ „	25	„	4° 6'	8 15 0
„ 4,	12 „ „	25	„	3° 5'	10 0 0

SOLE REPRESENTATIVE AGENT:—

HENRY F. PURSER, 31, Hatton Garden, LONDON, E.C.

[See preceding pages.]

TRIBEES CAMERAS

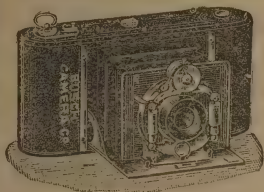
**HAND and
STAND.**

**For
PLATES and
FILMS.**

FITTED WITH

 **Busch Lenses.**

Send for New 1903 List. Many New Patterns in Preparation.



THE POCKET FILM CAMERA.

For Daylight Loading.

Spools, $3\frac{1}{2} \times 2\frac{1}{4}$. 12 Exposures.

With Unicum Shutter and Focussing Adjustment.

THE body of the Camera is of mahogany and aluminium, with fittings of brass, and the exterior covered with black grained leather. It has a **Unicum Shutter**, with time and instantaneous movements from one to a hundredth second, also a focussing adjustment, and scale for various distances—a feature unique in Cameras of this size.

The front draws forward and locks automatically into position, ready for taking objects and views situated at, and beyond, infinity point. For all other distances the front can be drawn forward and clamped into position, according to the scale of distances provided at the side. This advantage is of the utmost importance when we remember that the Lens, the Busch Detective Aplanat F 6, is of exceptionally large aperture, and that only by means of the focussing adjustment is one enabled to take the fullest advantage of the large aperture when photographing objects situated within the infinity point. It adds largely to the usefulness of the Camera in the taking of short-distance Scenes and Portrait work, and enables the photographer to take pictures all the year round, instead of only on the light days of summer.

Weight of complete Camera is 19 ozs.

Dimensions, closed, $7 \times 3\frac{3}{8} \times 1\frac{1}{8}$, and can be easily carried in the jacket pocket.

Black or Brown Solid Leather Case, 5/6.

PRICE - - - £4 15 0.

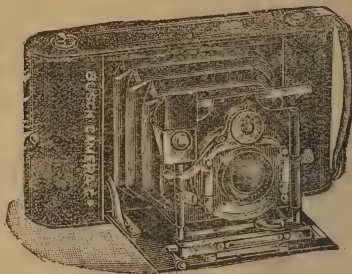
BUSCH CAMERA CO.

31, Hatton Garden, LONDON, E.C.

[See following pages,

"THE POCKAM."

QUARTER-
PLATE
DAYLIGHT
LOADING.



FOR . .
ROLL FILMS
OR
GLASS
PLATES.

THIS Camera is of the Folding Pocket type, the body being made of mahogany and aluminium covered with black grained leather. It folds up to the thickness of a book, and can be carried in the coat pocket. It has all the movements and advantages that are usually contained only in bulky Cameras, including a rising and sliding front—a feature possessed by no other Camera of a similar type. The front is drawn out and fixed automatically at infinity point, and focussing adjustment is provided for objects at shorter distances.

It has a reversible Brilliant View Finder and a View Meter working from the top of Lens front, which enables the operator to see exactly in full size the picture he is about to obtain on the film or plate.

A bush is provided for use of a stand and support when desiring to take vertical pictures.

The arrangements for controlling the winding of spool are of the latest and most perfect construction whereby the film is kept perfectly taut. As the block shows, horizontal

BUSCH CAMERA CO, 31, Hatton Garden, London, E.C.

[See preceding and following pages.

pictures are taken when the Camera is in the normal position—an advantage bearing in mind the fact that the majority of pictures are taken in this position.

It takes the roll cartridge film $3\frac{1}{4} \times 4\frac{1}{4}$ pictures, and by means of an ingenious adapter with focussing screen and hood and thin metal dark slides, plates of the same size can be used.

The size of Camera is $7\frac{7}{8} \times 4\frac{3}{4} \times 1\frac{3}{4}$ and weighs 22 ozs.

PRICES.

MODEL A.—With Busch Periplanat and Junior Everset Shutter	£4 4 0
MODEL B.—With Busch Detective Aplanat F6 and Unicum Shutter, Time and Instantaneous, 1 to 100th second	£5 15 0
MODEL C.—With Busch Anastigmat and Unicum Shutter	£7 7 6

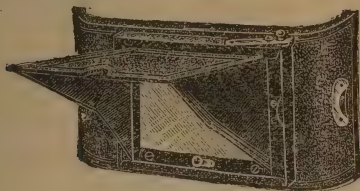


PLATE ADAPTER,

With 3 Metal Slides in Leatherette Case and Focussing Screen and Hood. 11/6 extra.

Extra Slides, 1/6 each. Case for 3 Slides, 1/- each.

Solid Leather Case, 6/6.

BUSCH CAMERA CO., 31, Hatton Garden, London, E.C.

[See preceding and following pages.]

"THE CYCAM"

CARTRIDGE FILM CAMERA.

**Constructed to take the
Daylight Loading Films, Size 5×4.**

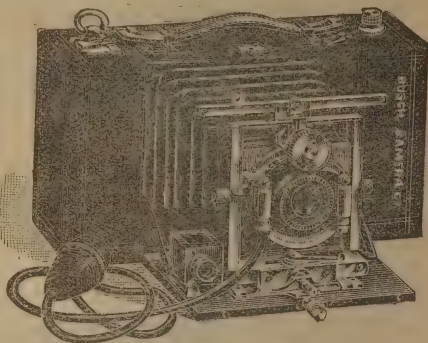
THE body of the camera is of well-seasoned mahogany, covered with black grained leather. The internal parts of polished mahogany and brass.

The base board falls down and the front is pulled forward and locked into position.

It will take the 4-inch Roll Film of any make, and the use of plates instead of films involves no increase in the bulk of the camera body.

The arrangement for the working of the films is such as to secure perfect alignment and easy manipulation.

The smallest and most compact roll film and plate camera on the market for 5×4 pictures.



Specification.

Rising, falling, and sliding front.

Brilliant View Finder, adjustable for horizontal or vertical pictures.

Busch Detective Aplanat Lens, working at F 6's.

Unicum Shutter, pneumatic and finger release, with instantaneous and time movements from 1 to 100th second.

Focussing Adjustment, and scale of distances in feet.

In addition to the ordinary View Finder a special metal frame and angle View Finder is provided.

Scale for focussing objects from 5 ft. to infinity.

Advantages.

1. The advantages over similar cameras are that in its normal position the picture is taken in what is known as the horizontal (the longest) way of the plate or film.

2. It is fitted with a high-class Lens, working at two and three times the rapidity of those usually fitted to hand cameras.

3. The use of plates instead of roll films requires no accessories, such as adapter, or increase in the bulk of the camera, beyond the plates in the slides.

PRICE: { Model A £6 10 0
Model B with BUSCH ANASTIGMAT 3 2 6

Glass Screen with Folding Hood and 6 Single Slides for plates, 17/6 extra.

Cloth-covered Envelopes to hold three slides, 1/0 each. Ex ra Slides, 3/0 each. Solid Leather Case, 8/0. Cycle Case with Clamp Attachments, 10/6. Case for Camera and Slides, 10/6. Stand, three-fold sliding legs, 10/6 each.

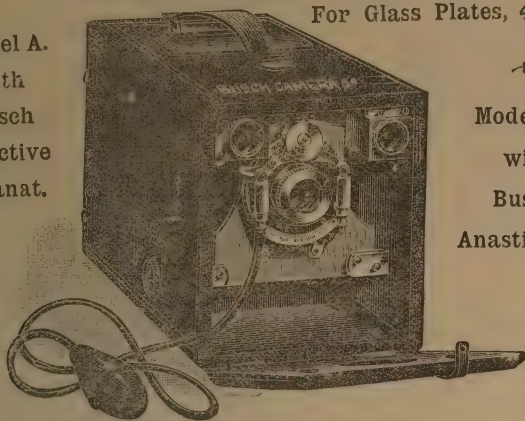
BUSCH CAMERA CO., 31, Hatton Garden, London, E.C.

[See preceding and following pages,

"THE TRIBEES" MAGAZINE CAMERA.

For Glass Plates, $4\frac{1}{4} \times 3\frac{1}{4}$

Model A.
with
Busch
Detective
Aplanat.



Model B.
with
Busch
Anastigmat.

MADE of solid mahogany, covered with fine black leather. It is substantially made and will stand the test of all climates. It has a capacity for twelve Plates, which are changed by the most perfect method, whereby it is impossible for them to jam, or more than one to drop at a time.

The majority of Hand Camera pictures being taken in the horizontal position the plates are made to fall horizontally. The number of each plate exposed is recorded on the top of camera, and the fallen plates are retained in position by means of springs.

Focussing is accomplished by means of a bellows rack worked by a thumb-screw outside, and is so arranged that exact adjustment of the lens to the scale is secured. The scale is read on the side of camera, and engraved for distance of five feet to infinity.

The Lens is the Busch Detective Aplanat of 5-inch focus working at F6, and is mounted on the Unicum Shutter, working between the combination and giving speeds from one to one-hundredth of a second, and time exposures by means of either the finger release or the pneumatic tube, both of which work from outside.

Two finders of special construction which require no shading, but give brilliant views in the strongest sunlight. Horizontal or vertical pictures can be obtained, and bushes and screws are provided for use on stand.

The great advantage of this camera is that on account of the ease and rapidity of changing and adjustment, it is possible to take a succession of pictures of the same object—an important consideration when desiring to "make sure" of a good picture of moving figures, &c.

The illustration shows camera with front open; the lens and shutter can be easily taken out for the purpose of cleaning. The pneumatic tube for the release of shutter can be used when necessary. It is passed through a hole at side of camera and worked from outside. When not in use it can be placed inside the front part of Camera.

PRICE: { Model A ... £6 10 0
Model B, with BUSCH ANASTIGMAT ... 8 0 0

Solid black leather cases for above, 8/6 each. Stand, three-fold, 10/6.

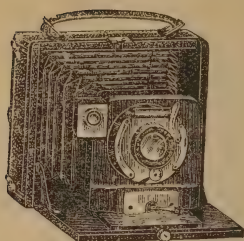
The camera as listed is for glass plates only. It can, however, be supplied for films only, or interchangeable for films or plates, at extra cost of 10/6 each. Glass plate series only kept in stock, others made to order.

BUSCH CAMERA CO., 31, Hatton Garden, London, E.C.

[See preceding and following pages.]

"THE BEECAM."

$4\frac{1}{4} \times 3\frac{1}{4}$



Consequent on the use of single metal Plate Holders this Camera is very much smaller than the usual $\frac{1}{2}$ -plate Folding Cameras.

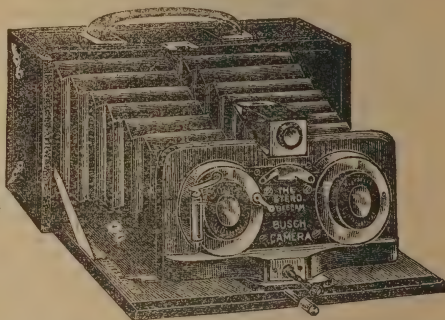
It has a fine Rack and Pinion Focussing Adjustment, and a Focussing Hood forming part of the screen.

The Lens is the Busch Periplanat fitted to the Everset Junior Shutter, with time and instantaneous movement, and Iris Diaphragm.

PRICE :—

With Three Plate Holders and Solid Leather Case	...	£2 17 6
Extra Slides, 1/6 each.	Envelope for Slides, 1/0.	
Same Camera, with Busch Detective Aplanat and Unicum Shutter	...	4 7 6

THE "Stereo Beecam."



This Camera is of the same construction and has the same movements as the Beecam, but is made for stereoscopic work and is fitted with a pair of Busch Periplanats.

The plate holders are of metal, and very light and portable.

PRICE :—

With Three Plate Holders and Solid Leather Case	...	£4 15 0
Extra Plate Holders, 3/0 each.		

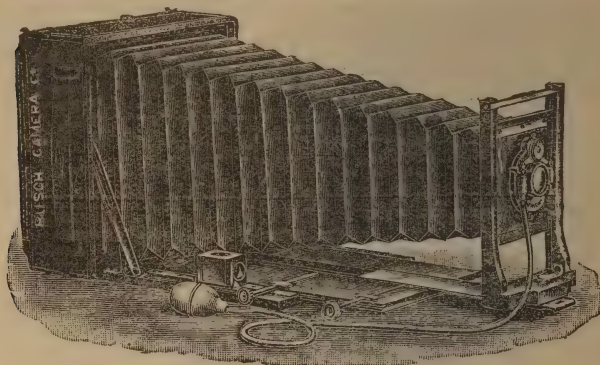
BUSCH CAMERA CO., 31, Hatton Garden, London, E.C.

[See preceding and following pages.]

THE .1. LONG EXTENSION FOLDING CAMERA.

Extension 17 inches.

THIS Camera is similar to our Swing Folding Camera, but having an extra long bellows extension specially suitable for use with set of lenses such as **Busch's Aplanat Sets**, the bellows extension being sufficient to



enable the Photographer to use all combinations of the sets and many of the single lenses also.

It has vertical and horizontal swing, reversible back, rising front.

Body is of mahogany with fittings of brass and covering of black grained leather, rack and pinion focussing adjustment.

The whole in solid leather case with three double dark slides.

The Camera can be had with the following **Busch Lenses and Sets**, including the **Unicum Shutter** with time and instantaneous movements from 1 to 100th second.

With Detective Aplanat No. 3 F-7	...	...	...	£7 17 6
„ Busch Anastigmat No. 3	...	...	...	9 17 6
„ „ Aplanat Shutter Set, Model A	...	...	...	9 0 0
„ „ „ „ „ „ B	...	...	...	10 0 0
„ „ „ „ „ „ C	...	...	...	£10 15 0

The set specially recommended is that of Model B, as all the Lenses of this set, single and in combination, can be used on this Camera. The foci given by this set are $4\frac{3}{4}$, $5\frac{1}{2}$, 6, 7, 8, and $9\frac{1}{2}$, 12, and 16 inches. Particulars of the other sets are contained in list of **Busch Lenses**.

BUSCH CAMERA CO., 31, Hatton Garden, London, E.C.

[See preceding pages.]

BOS

**SENSITIZED
ALBUMEN PAPER**

SHOULD BE IN EVERY PHOTOGRAPHER'S
PRINTING FRAME WHO DESIRES TO
OBTAIN PERMANENT RESULTS
SURPASSING COLLODION IN QUALITY &
WITH NONE OF ITS DISADVANTAGES
IN WORKING.

USED BY
MANY OF THE LARGEST & MOST CRITICAL
PROFESSIONALS IN THE UNITED KINGDOM.

SOLD IN
3 THICKNESSES
10 12 & 13 KI LO

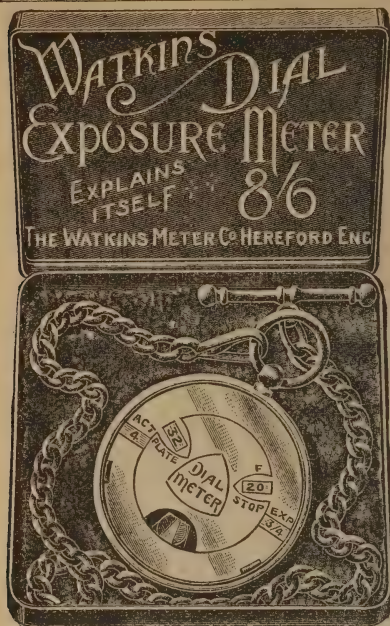
3 COLOURS
MAUVE
PINK
WHITE

NOT MADE IN GERMANY

TRIAL PACKET
WITH FULL INSTRUCTIONS

1/- POST FREE
FROM **H. E. BULLEN,**
WHOLESALE PHOTO DEALER
17, THORNCOMBE ROAD, EAST DULWICH, S.E.

WORKS CRISWICK



The New **STEADFAST PAPER** always darkens to same tint—a great improvement.

"I am highly pleased with the Dial Meter, the tint is so easily matched and the figures stand out so clear."

NICHOL TROUP,
Gourock.

"I consider the new Dial Meter perfection."

W. H. BULCOCK,
Clitheroe.

The **DIAL METER** is much improved since first issued.
Metal button to revolve glass.

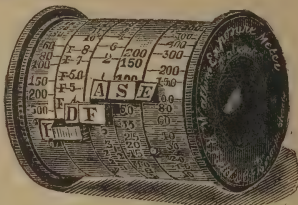
STANDARD METER, 15/-

The best and **only** complete one for copying and enlarging.

IN ALUMINIUM £1 1 0

"I have had my Meter five years; there is no depreciation account in connection with it, as its value to me increases year by year."

J. SMITH, Blackpool.



	s.	d.
INDOOR METER—for interiors—no scales	1	1
HAND CAMERA CALCULATOR—to screw on Camera	3	6
DAYLIGHT ENLARGING TEST BOX—tests light and negative	10	6
EIKRONOMETER—for timing development	10	6
SPEED CARD—new editions monthly	0	1 1/2
STEADFAST REFILLS WITH TINT—say if ribbon or disc	0	6
Ditto TRIPLE TINT (whole, quarter, 1/16) ribbon or disc	0	9
INSTRUCTIONS FOR ANY METER—specify pattern...	0	3
TRIPLE TINT TO ANY METER—extra	0	3

Post Free or from any dealer. All Meters on approval. Send for Price List.

The WATKINS METER Co., Hereford.

Users not tied down to one make of Plate.

READY FOR NEW SEASON.

WATKINS 2/6 METER.

A complete watch-shaped meter of great simplicity, will wear indefinitely, and carries its refills. With scales for all uses. We are laying down expensive machinery to turn this out in large quantities.

ALL DEALERS WILL STOCK THIS.

A great success, a second edition called for within five months of publication,

THE WATKINS MANUAL

OF EXPOSURE AND DEVELOPMENT. Limp cloth, illustrated,
1/-, by Post 1/2, Abroad 1/4.

"The Photographer will do well to pass by every text-book until he has mastered this comprehensive little manual."—*Westminster Gazette*.

"No book so deserving of an immense edition has appeared of late years."—*Photogram*.

"Mr. Watkins is far and away the best authority on the subject."
Daily Express.

"The most welcome Photographic Manual that we have received for a long time."—*Nature*.

"The book explains in a clear and characteristic way—characteristic on account of its thoroughness—how to make successful negatives."

Dundee Evening Telegraph.

Mr. Watkins has, in a very marked degree, the gift of making things clear in a few words."—*Amateur Photographer*.

"The most intelligent hand-book to photography published, every line is original."—*Optician*.

"The only satisfactory work on Exposure and Development that we have yet met with in any language."
Photographic News.

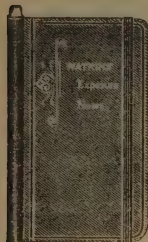
"THERE'S METHOD IN'T."

Now Ready, 5th Edition, 1/-; post free 1/1,

EXPOSURE NOTES.

An entirely new and altered edition, upright shape with pencil, columns for notes, simplified and equally adapted for all exposure methods.

The most practicable and saleable Note-book published.



The WATKINS METER Co., Hereford.

E. & T. UNDERWOOD,

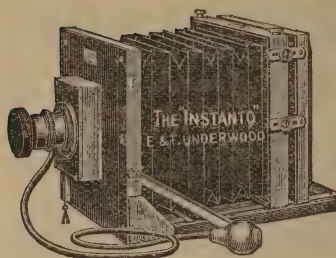
Patentees and Manufacturers,

Brunswick Works, 130-132, Granville St.,

BIRMINGHAM,

England.

THE "INSTANTO."



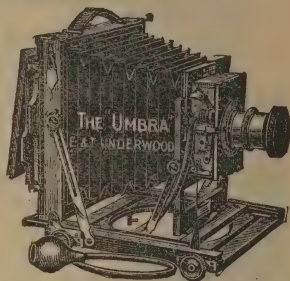
Of the finest polished mahogany, thoroughly seasoned to stand any climate. All movements, T. & I. shutter with speed indicator, R. R. lens, 3-fold sliding stand with automatic lock joint. Best book form double back with automatic locking catches.

$\frac{1}{4}$ -p., £2 6 0; $\frac{1}{2}$ -p., £4 4 0;
1/1-p., £6 6 0.

THE "UMBRA."

The New Double Pinion Camera.

Of the finest mahogany, beautifully polished, and having every movement. Double back, with spring snap and locking catch, 3-fold stand of polished ash, turntable, time and instantaneous shutter, and rapid rectilinear lens with Iris diaphragm.

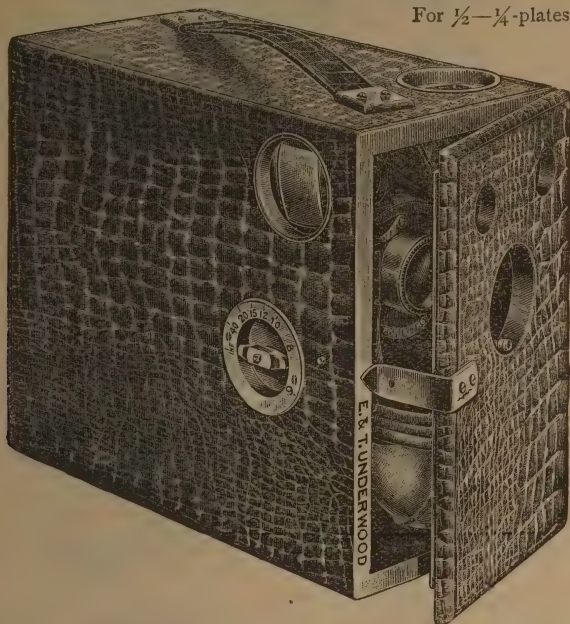


Prices complete:—

Half-p., £4 12 0; Whole-p., £6 12 0

New Illustrated Catalogue ready shortly.

London Agents: BENEFINK & CO., Cheapside, E.C.

E. & T. UNDERWOOD**THE NEW "AUTOMAT."**For $\frac{1}{2}$ — $\frac{1}{4}$ -plates.

No.	Description	£	s.	d.
No. 1.	Single achromatic lens, large size brilliant finders, self-setting T. and Inst. shutter with speeds and stops, two tripod bushes. Covered in black seal grain ...	1	1	0
„ 2.	Ditto, with focussing lenses for 4, 8 and 12 feet ...	1	5	0
„ 3.	With excellent rectilinear lens, and focussers for 4, 8 and 12 feet ...	1	16	0
„ 4.	With rectilinear lens, rack focussing from 5 feet, new aut. matic self-setting shutter—			
	Style A, black seal grain... ..	2	2	0
	„ B, polished crocodile grain	2	8	0
„ 5.	With 6-in. focus best quality rectilinear lens, R. & R. focussing, and Bausch & Lomb's new best automatic shutter—			
	Style A, black seal grain	3	3	0
	„ B, as illustration above	3	10	0

Brunswick Works, 132, Cranville Street, BIRMINGHAM, England.

W. E. Palmer
& Sons.



ENLARGING AND
— PRINTING

IN

PERMANENT CARBON,
PLATINOTYPE,
BROMIDE, ALBUMEN,
P.O.P., C.C., &c.



ESTABLISHED TWENTY YEARS.

Telegrams: "Carbon, New Barnet."



Works:

New Barnet, Herts.

BENETFINK & CO.'S

"LIGHTNING"



NONE
GENUINE



WITHOUT
OUR
LABEL.

THOUSANDS
IN USE
IN ALL PARTS
OF THE
WORLD.

HAND CAMERAS

GIVE UNIVERSAL
SATISFACTION.

For particulars
see following
pages.

RELIABLE IN ACTION!
NO COMPLICATIONS!!
EASY TO USE!!!

WHOLESALE AND RETAIL.

"LIGHTNING"

NONE
GENUINE



WITHOUT
OUR
LABEL.

Quarter-Plate:

£2 2 0

£3 3 0

£4 4 0

£8 10 0

HAND CAMERAS

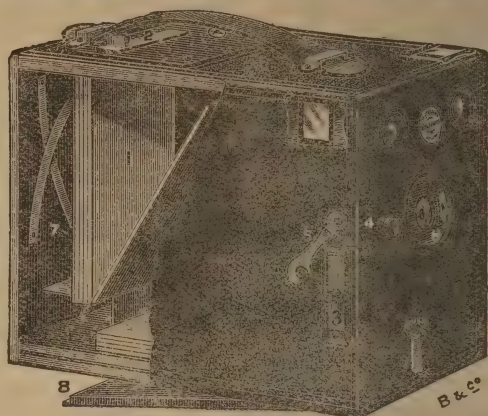


89, 90, 107, & 108,

CHEAPSIDE, LONDON, E.C.

See following pages.

BENETFINK

**&
CO.**
THE GREAT CITY DEPOT FOR AMATEUR PHOTOGRAPHERS.


The No. 1 "Lightning" Hand Camera.. 1903 MODEL.

The No. 1 Lightning is fitted with good quality single Achromatic Lens (giving splendid definition), Iris Diaphragm, Time and Instantaneous Shutter, with Indicator giving exposures of either the 15th, 25th, 50th or 100th part of a second, and two brilliant View Finders. The Camera carries 12 Plates and has Automatic changing which is very simple and effective; an Indicator is provided to record the number of exposures made, exposed plates can be removed from the light-tight chamber without interfering with those unexposed. A bush or screw plate is fixed on two sides of the Camera, and a screw supplied, so that it may be fitted to a stand to take either vertical or horizontal pictures.

It is also made to carry either 12 Plates or 24 Films (one plate occupying the space of 2 Films). The Lens is a fixed focus one, everything over 14 feet being well defined. For bringing near objects into focus magnifiers have to be used in front of the lens, which are sent out with every Camera, the distance being marked on each for 3, 5 and 9 feet respectively, these are carried in a receptacle at side of Camera.

Size of Camera, $\frac{1}{2}$ -plate 8 in. long, 7 in. high, and $4\frac{1}{2}$ in. wide, covered in Black Leather, full instructions sent out with each.

PRICES.

$\frac{1}{2}$ -plate size, $4\frac{1}{2} \times 3\frac{1}{2}$	42/-	5×4 size	57/-
--	------	--------------------------	------

If adapted to carry both Plates and Films (either size) ... 10/6 extra.

Carrying Cases, fitted with Shoulder Strap, Handle and Lock and Key

$\frac{1}{2}$ -plate size, in Stiff Canvas	7/6	5×4 size, in Stiff Canvas	8/6
$\frac{1}{2}$ " " in Solid Leather	11/6	5×4 " in Solid Leather	14/6

Cases for the Interchangeable Cameras, 1/- each extra on above prices.

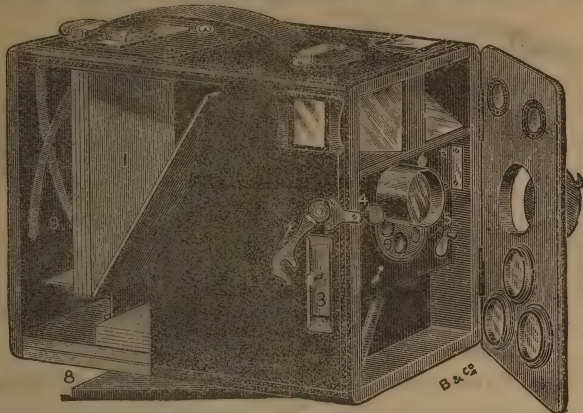
CHEAPSIDE, LONDON, E.C.

See preceding and following pages.

BENET FINK

**&
CO.**

THE GREAT CITY DEPOT FOR AMATEUR PHOTOGRAPHERS.



The A1 "Lightning" Hand Camera.

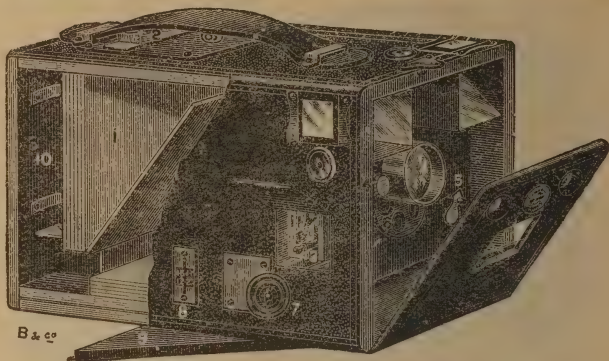
The A1 Lightning is similar in construction to the No. 1, fitted with superior achromatic Rapid Rectilinear Lens, working at a large aperture, F.8, and a pair of brilliant View Finders. The Diaphragms are of the revolving type, fixed between the Lenses. A Speed Indicator is attached to the Shutter, which can be set to work from the 25th to the 500th part of a second, also for Time and prolonged exposures. The front opens to enable the operator to alter the Diaphragms and Shutter. The R.R. Lens is far superior to the single Achromatic, being more rapid and suitable for architectural work, it is a fixed focus one, everything over 14 ft. being well defined. For bringing near objects into focus, magnifiers have to be used in front of the Lens, which are sent out with every Camera, the distance being marked on each for 3, 6, and 9 feet respectively. These are carried on the inside of the front door, as shown in illustration. A bush or screw plate is fixed on two sides of the Camera, and a screw supplied, so that it may be fitted to a stand to take either vertical or horizontal pictures. Size of Camera, $\frac{1}{4}$ -plate, 8 in. long, 7 in. high, and $\frac{1}{4}$ in. wide, covered in Black Leather.

PRICES.

$\frac{1}{2}$ -plate size $4\frac{1}{4} \times 3\frac{1}{2}$	£3 3 0	5×4 size	£3 16 0
$\frac{1}{2}$ -plate size, fitted with Taylor, & Hobson's R.R. Lens			5 0 0
5×4 do. do. do. do.			6 2 0

BENETFINK

&
CO.



The No. 2 Focussing "Lightning" Hand Camera. 1903 MODEL.

The No. 2 Lightning is a Focussing Hand Camera, the distances ranging from 5 to 24 feet, being altered by Rack and Pinion Adjustment. It carries 12 Plates which are changed in the same manner as the No. 1. The Lens is a Superior Achromatic Rapid Rectilinear, working at a large aperture, F 8. The Diaphragms are of the revolving type, fixed between the Lenses. The Shutter is arranged for either Time, Instantaneous or prolonged exposures, and has attached a Speed Indicator, which can be set from the 25th to the 90th part of a second. A pair of brilliant View Finders are fitted to the Camera body, also two Circular Spirit Levels. Two Bushes are fixed to the Camera, and a screw is supplied with each for using on Tripod. It is covered with Black Leather, and is altogether a most complete instrument. A sliding shutter is fitted on the inside of the falling front, which shuts off the lens. The dimensions of $\frac{1}{4}$ -plate size being only 9 in. long, 6 in. high, and $5\frac{1}{2}$ in. wide, make it very suitable for cycling.

PRICES.

$\frac{1}{4}$ plate size, $4\frac{1}{4} \times 3\frac{1}{4}$...	£4 4 0	|	5 X 4 size ...	£5 8 0
$\frac{1}{4}$ -plate size, fitted with Taylor, Taylor & Hobson's R.R. Lens ...			... ..	6 1 6
5 X 4 do. do. do. do. ...			... ..	7 14 0

If adapted to carry both Plates and Films (12 Plates or 24 Films) one Plate occupying the space of two Films, 10/6 extra, either size.

Carrying Cases, fitted with Shoulder Strap, Handle, and Lock and Key—

$\frac{1}{4}$ -plate size, in Stiff Canvas... ..	7/6	|	5 X 4 size, in Stiff Canvas	8/6
Do. in Solid Leather	11/6	|	Do. in Solid Leather	14/6

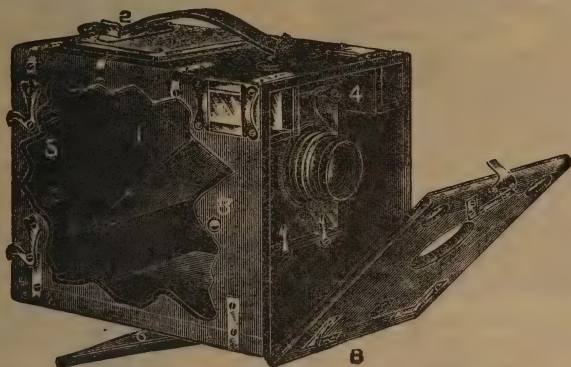
Cases for the Interchangeable Cameras, 1/- each extra on above prices.

CHEAPSIDE, LONDON, E.C.

See preceding and following pages.

BENET FINK & CO.

THE GREAT CITY DEPOT FOR AMATEUR PHOTOGRAPHERS.



The "Lightning de Luxe" Hand Camera.
1903 MODEL.

This is a first quality instrument, brass bound, and fitted with a focussing Cooke lens series III. F. 6.5, which contains within itself a means of focussing objects at various distances, *i.e.*, 3, 4, 6 and 10 yards respectively. This is accomplished simply by turning the front ring of the lens mount, which has a scale of distances engraved upon it. The lens is attached to a new patent time and instantaneous shutter, giving various speeds of exposure, which range from 1 to the rooth part of a second. The Camera carries 12 4-plates which are changed in the same manner as the other models of "Lightning" Cameras. Two brilliant view finders are fitted in the body. Supplied either in beautifully polished mahogany or neatly covered in black leather.

Price £8 10. 0.

Stiff Canvas Carrying Case	7/6
Leather ditto	11/6

Portable 3-fold Cyclist Tripod Stand, suitable for using with above **6/3**. **Carrying Case** for Stand, **2/6**.

Brass Telescopic Stand, 9/3. Carrying Case, 3/3.

Aluminium Telescopic Stand, 14/-. Carrying Case, 3/3.

CHEAPSIDE, LONDON, E.C.

BENETFINK

&
CO.

THE GREAT CITY DEPOT FOR AMATEUR PHOTOGRAPHERS.



STIFF BROWN WATERPROOF CANVAS CASES.

Leather bound, fitted with lock and key, shoulder strap and two straps with buckles, also carrying handle; large enough to hold Camera, three dark slides, lens, &c., lined with cloth.

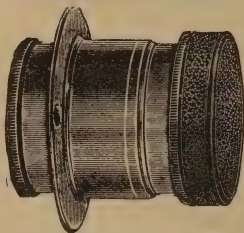
$\frac{1}{2}$ plate size,	6/6,	postage extra.
$\frac{2}{3}$ "	8/6	" "
$\frac{3}{4}$ "	9/6	" "

THE CYCLISTS' 3-FOLD STAND,

with automatic catches, sliding leg, and triangle top. Height when opened 4 ft., length when closed 20 inches weight, including top, under 1 $\frac{1}{2}$ lbs. 6/3 net.

Cases specially suited for attaching to bicycle, as illustration, 2/6 net.

CATALOGUES POST FREE.

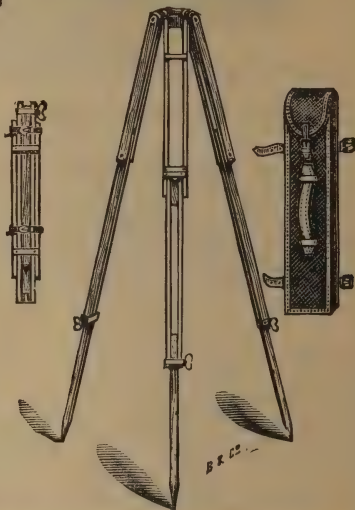


The "AJAX" LENS.

Single achromatic giving splendid definition, with sliding tube for focussing. Full Aperture F11.

$\frac{1}{2}$ -plate size,	about 5 $\frac{1}{2}$ in. focus...	3/6 net.
$\frac{2}{3}$ "	8 $\frac{1}{2}$ in. "	6/6 "
$\frac{3}{4}$ "	11 in. "	9/- "
$\frac{1}{2}$ -plate unmounted Lens,	5 $\frac{1}{2}$ in. focus,	1/6 net.

89, 90, 107 & 103,



CHEAPSIDE, LONDON, E.C.

See preceding and following pages.

BENEFINK

&
CO.

THE GREAT CITY DEPOT FOR AMATEUR PHOTOGRAPHERS.



Scales and Weights with Movable

Brass Pillar, & Lever for Weighing.

Size	1	with 6in. Beam & 2½in. Pans	Glass.	Brass
" 2	" 7	" 3	4/3	4/-
" 3	" 8	" 3½	5/-	4/9
" 3	" 8	" 3½	6/-	5/9

Complete in Polished Oak Box with Sliding Drawer.

Size 1 weighs from ½ grain up to ½ ounce.

" 2	" ½ grain	" 1 ounce.
" 3	" ½ grain	" 2 ounces.

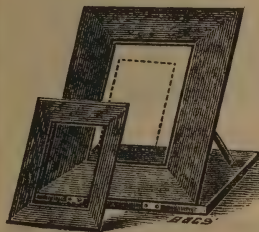
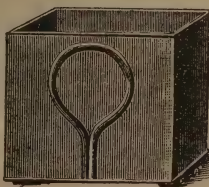
Zinc Washing Tank and Rack

½-plate, to hold 12 plates ... 2/- net.

¾-plate " ... 3/3 "

1-plate " ... 4/3 "

Do. to hold 12 ½-plates,
or 6 ¾ or 1-plates, 3/3 net.



Retouching Desk (as Illustration).

For ½ and ¾-plate Negatives.

2/8 net.

Superior Retouching Desk.

With Opal Reflector 8/-

Do., do., with Drawer underneath for
holding Percils, &c. 11/6

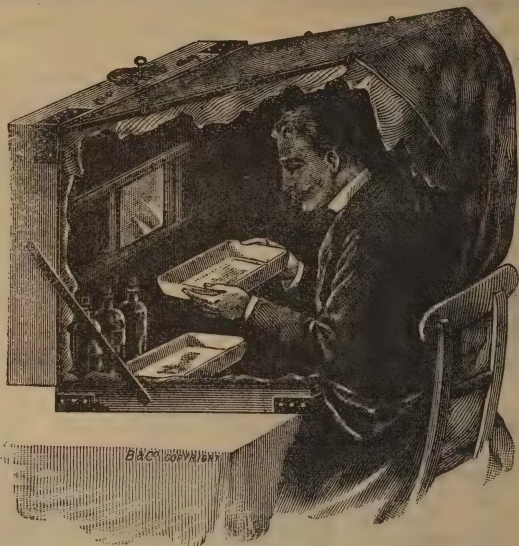
CHEAPSIDE, LONDON, E.C.

See preceding and following pages

BENETFINK

&
CO.

THE GREAT CITY DEPOT FOR AMATEUR PHOTOGRAPHERS.



PORTABLE DEVELOPING TENT.

No. 2.

Is made in box form with lock and key and handle on top for carrying, quite efficient for developing purposes, it is perfectly light tight, the covering being made of two-fold black twill and one fold canary, it is fitted with ruby glass pane on runners which admits white light at will.

The inside measurement of base is 23 X 16 inches, which is varnished, and has a shelf for holding bottles. There is ample room for operator to sit erect comfortably as shown in illustration.

Price, 42/- net.

SPECIAL QUOTATIONS FOR QUANTITIES.

IMMENSE STOCK OF ALL ACCESSORIES.

CATALOGUE with over 800 Illustrations Post Free.

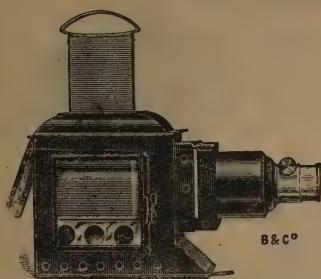
89, 90, 107 & 108.

CHEAPSIDE, LONDON, E.C.

See preceding and following pages.

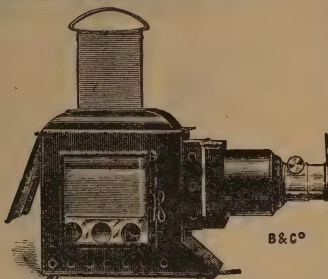
BENETFINK & CO

THE GREAT CITY DEPOT FOR AMATEUR PHOTOGRAPHERS.



B&C^o

Japanned Tin Lantern, fitted with 4 inch Condensers, Sliding Tube, Rackwork Lens, and 3-wick Lamp for burning petroleum. Net, 16/-

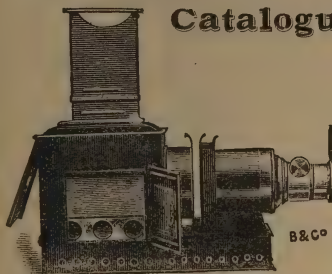


B&C^o

Japanned Tin Lantern, fitted with 4 inch Condensers, Sliding Tube, Rackwork Lens, 4-wick Lamp for burning petroleum, Flasher to Lens, and packed in Carrying Case. Net, 21/-

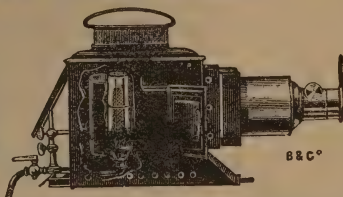
Lecturer's Lanterns.

Catalogues Post Free.



B&C^o

New Pattern Japanned Tin Lantern, with 4-inch Condenser, Sliding front, good quality Protection Lens with Flasher, and Rack and Pinion Focussing, 4-wick Lamp for burning petroleum, packed complete in neat Metal Case. Net, 23/-



B&C^o

Russian Iron Lantern, adapted for use with Incandescent Gas, 4-inch Condensers, Brass Sliding Front, good quality Projection Lens with Flasher, and Rack and Pinion Focussing. Price, complete in Metal Case, containing Welsbach C. Burner, with Mantle and Talc Chimney, Gas Jet, and Tray, Reflector, and Special Top, as illustration. Net, 30/-

89, 90, 107, & 108,

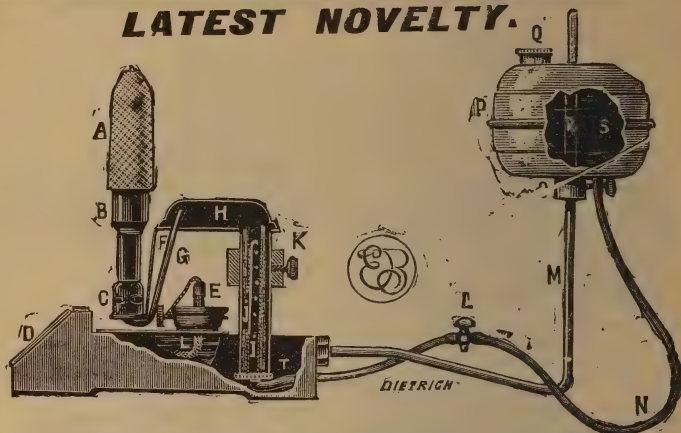
CHEAPSIDE, LONDON, E.C.

See preceding and following pages.

BENET FINK

&
CO.'S

LATEST NOVELTY.



The "Sol" Projection Lamp.

FOR Projection, Enlarging, and General Use. Incandescent light obtained by means of methylated spirit in conjunction with an incandescent mantle. Can be used in any lantern taking an ordinary three or four-wick lamp, and gives a more brilliant light than either Petroleum or Incandescent Gas. The lamp will burn with uniform brilliancy for about $2\frac{1}{2}$ hours.

The apparatus is made entirely of nickled copper, of the best workmanship, and if the instructions are carried out carefully, will give most satisfactory results. Full particulars free on application.

Price 28/-

89, 90, 107, & 108,

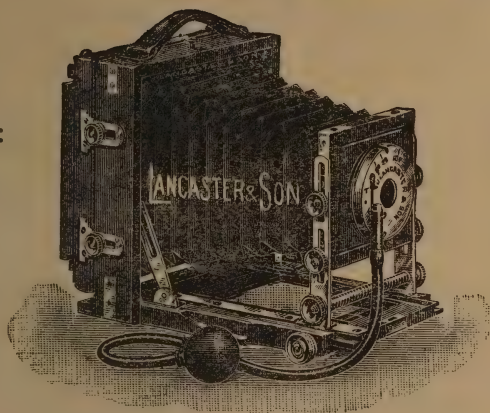
CHEAPSIDE, LONDON, E.C.

See preceding and following pages.

BENETFINK & CO.

THE Great City Depot for LANCASTER'S CAMERAS.

Cash
Discount:
5%
off
Maker's
Prices.



Cash
Discount:
5%
off
Maker's
Prices.

Lancaster's "Instantograph."

Complete with Lens, Stand, and Dark Slide, $\frac{1}{4}$ -plate, £1 19 10; $\frac{1}{2}$ -plate, £3 19 9.

Immense Stock.

Catalogues Post Free.

[PLEASE MENTION THIS ALMANACK.]

CHEAPSIDE, LONDON, E.C.

For further particulars see following pages.

COLMORE ROW, BIRMINGHAM.

January 1st, 1903.

J. LANCASTER & SON

HAVE again to thank their Customers, Home and Foreign, for their continuous support, and wish to call attention to the following 64 pages, containing some of their Photographic Novelties. They especially desire to assure Foreign Buyers that every care and attention is given to the execution and packing of all Indents. Personal supervision is given in these departments, and all orders are most carefully carried out.

J. L. & S. will be pleased to send following Catalogues free on application:—

Photographic Catalogue, 1903.

Optical Catalogue, 1903.

Lantern Catalogue, 1903.

Specimen Photographs and
Show Cards.

1903. J. LANCASTER & SON, Opticians. 1903.

*Catalogue**of***Photographic
Apparatus.****Messrs. J. LANCASTER & SON**HAVE MUCH PLEASURE AND GRATIFICATION IN ACKNOWLEDGING
THE SALE UP TO DATE OF**Over 320,000 Cameras**

AND

370,000 Lenses.

THESE have been sold upon their merits alone; not a single Testimonial has ever been printed, nor a press puff ever paid for, but that invaluable "aid to commerce," a kindly recommendation from friend to friend, has produced a demand which exceeds 20,000 Cameras per annum.



Their Registered Trade Mark is put on every Camera, Lens, Slide, &c., sent out by them, and Buyers should reject any article not marked.

All Orders must be accompanied by a Remittance.

POST OFFICE ORDERS PAYABLE TO—

J. LANCASTER & SON, General Post Office, BIRMINGHAM.

Cheques crossed "Birmingham District and Counties Banking Co."

We are compelled to adhere strictly to this rule; our Prices are too low to allow of Bookings, &c.

SPECIAL NOTICE.—We do not pay Carriage or send Goods by Parcel Post unless an amount sufficient to cover Carriage or Post is enclosed with Order.

All prices are strictly nett. All previous catalogues cancelled.

COLMORE ROW, BIRMINGHAM.

J. LANCASTER & SON, OPTICIANS,

THE 1903

"Pocket Merveilleux"

(PATENT).



All Latest Improvements
Up-to-Date Camera
For Hand or Stand Use
Very Compact
Light and Strong

THE "POCKET MERVEILLEUX" is one of the neatest and handiest Cameras ever constructed, and is strongly made, and built in such a form as to be suitable either for hand or stand at will. It has an Achromatic Meniscus Lens, and New Patent Time and Instantaneous Shutter, and Rack Focussing Adjustment.

There are no loose screws or parts. Camera can be opened or closed in an instant. There is a Focussing Screen and Double Dry Slide, and Camera Stand with new Patent Attachment.

PRICES.

 $\frac{1}{4}$ -plate, £1 1 0

 $\frac{1}{2}$ -plate, £2 2 0

 $\frac{3}{4}$ -plate, £3 3 0

A.—Complete Set of Chemicals for
Negatives, including plates,

dishes, lamp, solutions, &c. ...

B.—Ditto, with printing materials,
printing frame, dishes, &c. ...

C.—Ditto, ditto, in polished cabinet
with lock and key ...

Extra slides ...

 $\frac{1}{4}$ -plate.

 $\frac{1}{2}$ -plate.

 $\frac{3}{4}$ -plate.

£0 6 8

£0 10 8

£0 12 8

0 11 6

1 0 8

1 7 0

1 1 0

1 15 8

2 7 0

0 3 8

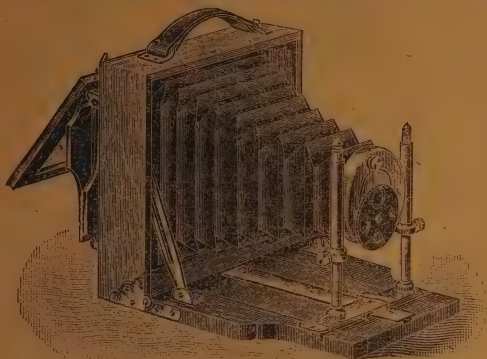
0 7 8

0 12 8

COLMORE ROW, BIRMINGHAM.

J. LANCASTER & SON, OPTICIANS,

THE 1903 NEW MODEL,
"LE MERVEILLEUX."



THIS is an excellent Apparatus, consisting of a much improved Mahogany Camera with Reversing Back, Achromatic Lens, Lancaster's New Iris Shutter (for time and instantaneous exposures), Mahogany Double-Dry Slide, and Camera Stand.

Each Set consists of Camera, Double Dry Slide, Lens, and Stand.

300	"Le Merveilleux," for $\frac{1}{2}$ plate...	£1 1 0
302	" " " " " "	2 2 0
304	" " " " " "	3 3 0
305	" " " " 10x8 plate ...	4 4 0
306	" " " " 12x10 plate ...	5 5 9
307	" " " " 15x12 plate ...	6 6 0

A—Complete Set of Chemicals for Negatives, including plates, dishes, lamp, solutions, &c., marked **A**.

B—Ditto, with printing materials, printing frame, dishes, &c., marked **B**.

C—Ditto, ditto, in Polished Cabinet, with Lock and Key, marked **C**.

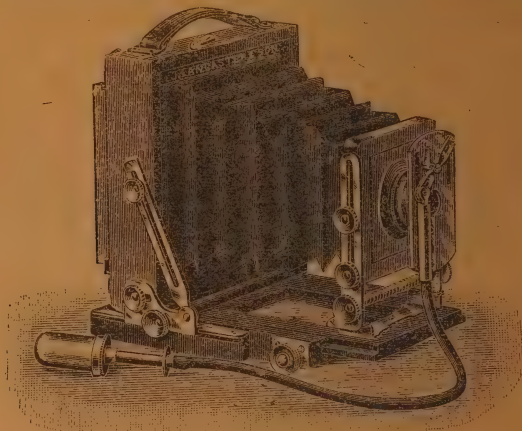
	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	10x8	12x10
A ...	£0 6 6	£0 10 6	£0 12 6	£1 1 0	£1 10 0
B ...	0 11 6	1 0 6	1 7 0	2 2 0	2 15 0
C ...	1 1 0	1 15 6	2 7 0	—	—
Extra Slides	0 3 6	0 7 6	0 12 6	1 1 0	1 5 0
Carriers	0 1 6	0 1 6	0 2 6	0 3 0	0 3 6

GOLDBERE ROW, BIRMINGHAM.

J. LANCASTER & SON, OPTICIANS,

The 1903 "Le Meritoire."

New Model.



Excellent Set.

THIS Apparatus is an entirely new Model, with Double Swing, Rising Front, Rack Adjustment, Finest Quality Achromatic Lens, with Iris Diaphragm, Patent See-Saw Shutter for Time and Instantaneous Exposures, Polished Camera Stand, &c.

Each Set consists of Camera, Double Dry Slide, Lens and Stand.

310	...	"Le Meritoire" for $\frac{1}{4}$ plates	...	...	...	...	£1 11 6
312	...	"	"	"	"	...	3 3 0
314	...	"	"	"	"	...	4 10 0
315	...	"	"	10×8 plates	...	...	6 0 0
316	...	"	"	12×10 "	...	...	7 10 0
317	...	"	"	15×12 "	...	...	8 10 0

A.—Complete Set of Chemicals, Dishes, Plates, Ruby Lamp and Solutions for Negatives.

B.—Ditto, with Set of extra Chemicals, Printing Frame, Printing Paper, and Dishes for Prints.

C.—Ditto, ditto, in Polished Cabinet, with Lock and Key.

		$\frac{1}{4}$	$\frac{1}{2}$	$\frac{3}{4}$	10×8	12×10
A	...	£0 6 6	£0 10 6	£0 12 6	£1 1 0	£1 10 0
B	...	0 11 6	1 0 6	1 7 0	2 2 0	2 15 0
C	...	1 1 0	1 15 6	2 7 0	—	—
Lancaster's Patent Solid						
Double Slides	...	0 3 6	0 6 0	0 10 6	—	—
Double Dry Slides	...	0 5 6	0 10 6	0 13 0	1 5 0	1 15 0
Wet Plate Slides	...	0 5 0	0 10 0	0 16 0	1 1 0	1 10 0
Carriers	...	—	0 1 6	2 6	0 3 0	0 3 6

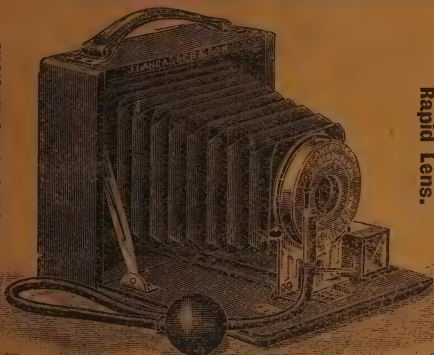
COLMORE ROW, BIRMINGHAM.

J. LANCASTER & SON, OPTICIANS,

The 1903 Cyclekam.

LANCASTER'S NEW CYCLISTS' CAMERA.

Excellent Definition.



Rapid Lens.

THIS is a new Camera designed expressly for those desiring a Camera of extreme lightness and simplicity for cycle work. It is a well-finished apparatus, and can be used for horizontal or vertical pictures. The Lens is a rapid single one, with new shutter with Iris diaphragm, and adjustments for Instantaneous, Ball, or Time Exposures, and

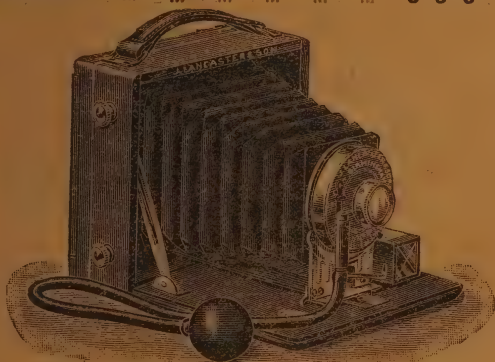
capable of the highest class of work. The Camera is also made with Rectilinear Lens and new Iris shutter between the lenses, and fitted with Double Swing Back (see Illustration No. 2).

A Finder and Distance Scale are included with either form of Camera.

PRICES.

	$\frac{1}{4}$ -plate.	$\frac{1}{2}$ -plate.
The Cyclekam, with Single Instantaneous Lens, Iris Shutter, Double Slide, and Finder	£1 5 0	£2 10 0
The Cyclekam, with Rectilinear Lens, Iris Shutter, Double Swing Back, Double Slide, and Finder	1 15 0	3 10 0
Extra Double Slides	0 3 6	0 7 6

Iris Shutter.



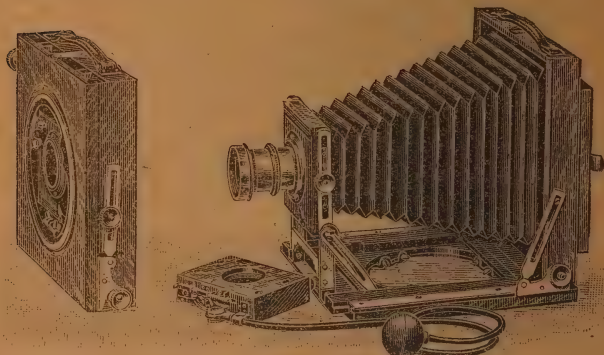
Best Quality.

Fine Finish.

THE CYCLEKAM WITH RECTILINEAR LENS.
COLMORE ROW, BIRMINGHAM.

J. LANCASTER & SON, OPTICIANS,

LANCASTER'S 1903 "KAMRET"



Light and Strong.

Perfect Camera.

Not a Loose Screw.

Nothing to Lose.

LANCASTER'S New Camera, "The Kamret," is one of the finest Cameras extant. It is made of best mahogany, with new pattern Leather Bellows, new Folding Front, no part detachable. Rack adjustment, Rectilinear Lens, and Blind Shutter, Double Slide, and new form of Stand.

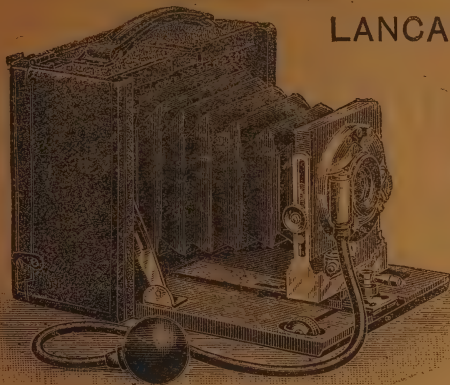
PRICES.

	10×8	12×10
£2 5 0	£3 5 0	£4 15 0
£6 10 0	£9 0 0	
Extra Slides 3/6	7/6	12/6
21/	25/-	

Waterproof Cases, with Shoulder Straps to carry Camera, Lens, Slide and Shutter, 1/1, 2/6; 1/1, 3/9; 1/1, 5/-

COLMORE ROW, BIRMINGHAM

J. LANCASTER & SON, Opticians,



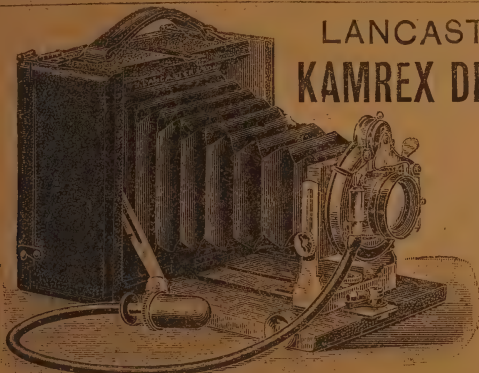
LANCASTER'S

1903

KAMREX.

Lancaster's New "KAMREX" is specially designed for Cycle or Tourist use, and is made of mahogany, covered in best leather, neatly finished in every respect. It has the finest quality Instantaneous Lens and New Iris Shutter, giving Time and Instantaneous Exposures, with Patent Pneumatic Release. There is a new Rack-work Front Stage, Double Dry Slide, and polished Portable Stand. It is a compact and convenient Apparatus, with Rising and Cross Fronts, giving all the advantages of a Hand and Stand Camera.

PRICES:—Quarter-plate, £2 2 0; Half-plate, £4 4 0; Whole-plate, £6 6 0
Extra Slides " 6/ " 10/6 " 16/

LANCASTER'S
KAMREX DE LUXE.

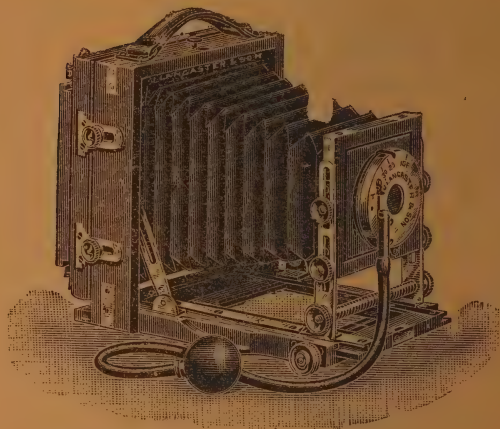
"KAMREX" with RECTIGRAPH LENS, with Iris Time and Instantaneous Shutter. This Camera is of the finest quality, with Anastigmat Rectigraph, Patent Iris Shutter, Time or Instantaneous, giving any required exposure down to one-hundredth of a second.

PRICES:—Quarter-plate, £3 10 0; Half-plate, £6 6 0; Whole-plate, £9 9 0

COLMORE ROW, BIRMINGHAM,

J. LANCASTER & , OPTICIANS,

THE

1903 BB INSTANTOGRAPH.
(PATENT.)Over 100,000 have been sold.
New Pattern.Everything an Amateur
can desire.

THE 1903 BB INSTANTOGRAPH is well ahead of the times, and has every modern improvement, including Lancaster's latest Iris Diaphragm and Iris Shutter, completely under control, giving any exposures required. No amateur could desire a better apparatus.

Each Set consists of Camera, Slide, Lens, Shutter, and Stand.

320	Price complete, for $\frac{1}{4}$ plate	£2 2 0
322	" " " " " "	4 4 0
324	" " " " " "	6 6 0
325	" " " " " " 10×8 plate	8 8 0
326	" " " " " " 12×10	10 10 0
327	" " " " " " 15×12	12 12 0

If with Rectigraph Lens and See-Saw Shutter, in place of Instantaneous Lens and Shutter, Extra cost:—

plate...	£1 2 6	10×8 plate	£2 17 6
" " " "	1 17 6	12×10	3 15 0
" " " "	2 7 6	15×12	4 10 0

COLMORE ROW, BIRMINGHAM.

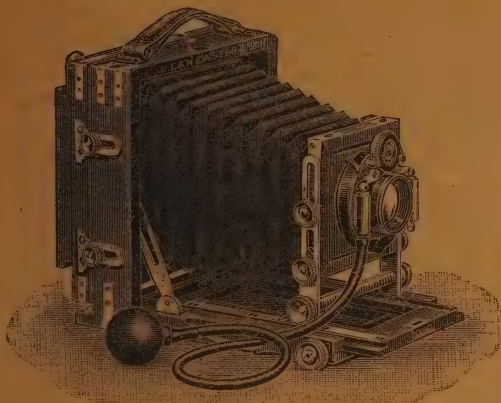
J. LANCASTER & SON, Opticians,

Lancaster's Euryscope

Instantograph.

With Euryscope Rectigraph working at *f* 6.

EXQUISITE DEFINITION.

HIGHEST QUALITY AT
LOWEST PRICE.

THE EURYSCOPE INSTANTOGRAPH consists of Brass-bound Camera with Double-swing, Rising Front, Euryscope Rectigraph Lens working at *f* 6, Patent Iris Shutter, giving fixed exposures to $\frac{1}{100}$ th of a second, time exposures of any length and hand exposures at the will of the operator, Double Dry Slide, Three-fold Ash Stand of best construction. The Camera, Lens, Shutter, and Slide all packed in leather bound case with shoulder and hand straps.

Price complete— $\frac{1}{4}$ -plate, 84/- ; $\frac{1}{2}$ -plate, 150/-.

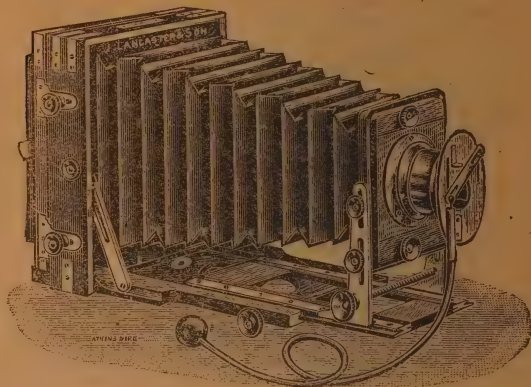
OOLMORE ROW, BIRMINGHAM.

J. LANCASTER & SON, OPTICIANS,

The 1903

Aluminium
Mounted**"Instantograph"***This Apparatus is about as Perfect, Portable and Light
as it is possible to make one.*

The Amateur's Delight



and Constant Companion.

This Camera is made out of selected Mahogany, and is of the smallest possible size, with a due regard to strength. It has Aluminium Binding, Aluminium Front Stage, Plates, Screws, &c., so that the Camera is the Lightest ever made. It has Rising Front, Double Swing Back, Long Extension, Reversing Back, and all recent improvements.

The Lens is a specially selected one, mounted in Aluminium, and has our Patent Aluminium See-Saw Shutter.

The Stand has an Aluminium Top, and the whole apparatus is perfect and complete.

Camera, Slide, Lens, Shutter and Stand ...	£3 3 0	£5 10 0	£8 0 0	10×8 £10 10 0	12×10 £12 12 0
Extra Slides, Aluminium Bound ...	0 10 0	0 15 0	1 5 0	1 15 0	2 5 0
Sets of Chemicals for Negatives & Prints, &c.	0 11 0	1 5 0	1 15 0	2 10 0	3 3 0

**If with Aluminium Rectigraph and Aluminium See-Saw
Shutter in place of Instantograph Lens, Extra Cost:**

Quarter-plate—£1 10 0 Half-plate—£2 10 0 Whole-plate—£3 10 0

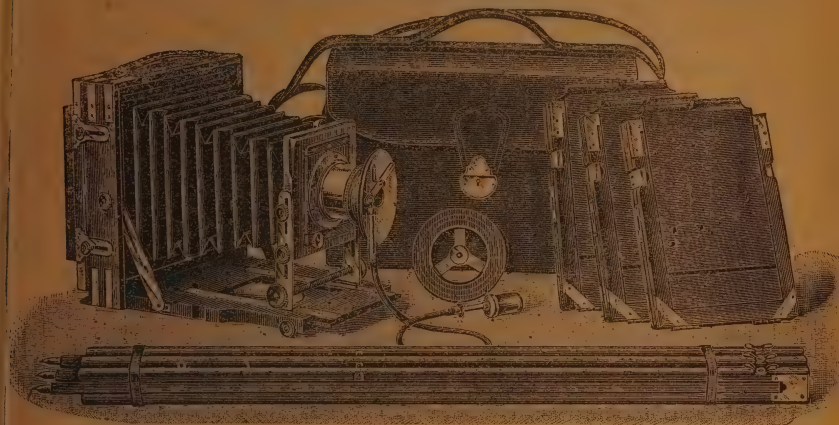
COLMORE ROW, BIRMINGHAM.

J. LANCASTER & SON, OPTICIANS,

The 1903 Aluminium "Pocket Instantograph."

Mounted in Aluminium.

(PATENT.)



THIS CAMERA is on the lines of the "Instantograph," but is considerably lighter in construction, and the various metal parts are of Aluminium. For compactness and portability it is a most attractive apparatus. It is well finished and exceedingly rigid, with no loose parts; easily and quickly set up, and capable of giving best results. The Camera is made of best Mahogany with Leather Bellows, and has all necessary movements; it has Double Extension with Rack and Pinion Adjustment, Rising Front, Double Swing Back, and Reversing Frame for Horizontal or Vertical Pictures. The Double Dark Slides are of Book Form with Aluminium Fittings, and three are included in each set. The Lens is very rapid, mounted in Aluminium, and fitted with Iris Diaphragm and Aluminium Time and Instantaneous See-Saw Shutter. The Stand is a folding one with Aluminium Top and Fittings, and well constructed of Polished Ash. The Camera, Lens, Shutter, and three Double Dry Slides are carried in a Leather Case with lock and key, and form altogether a most beautiful set.

Quarter.	Half.	Whole.
£ s. d.	£ s. d.	£ s. d.

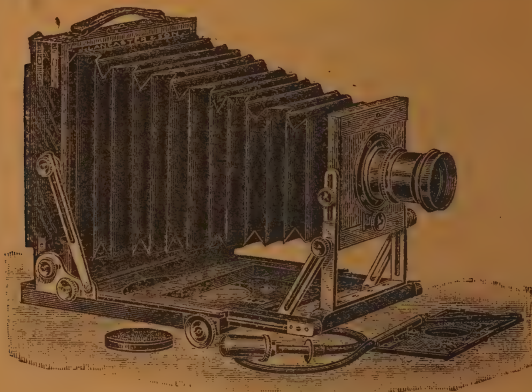
Pocket Instantograph Camera with three Double Dry Slides in case, no Lens or Stand	3 3 0	5 10 0	7 10 0
Pocket Instantograph, including Camera, Lens, Shutter, three Aluminium Bound Slides, Leather Case, and Aluminium Mounted Stand	4 4 0	7 7 0	10 10 0
Pocket Instantograph, with Rectigraph Lens, mounted in Aluminium	5 10 0	10 0 0	13 10 0

COLMORE ROW, BIRMINGHAM.

J LANCASTER & SON, OPTICIANS,

THE 1903

"IMPERIAL INSTANTOGRAPH."



OPEN.

THIS is a New Camera of great strength, portability, and lightness. It unfolds and folds with the utmost rapidity, and has Double Swing Back, Rising and Cross Front, Long Extension Camera, with one Double Slide.

	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{1}{1}$	10 x 8	12 x 10	15 x 12
PRICES—	£1 17 6	£3 10 0	£5 0 0	£6 0 0	£7 0 0	£8 0 0

SETS.

Consisting of Camera, Instantaneous Lens, Shutter, Slide, and Stand.

$\frac{1}{4}$		$\frac{1}{2}$		$\frac{1}{1}$
£3 3 0	...	£5 10 0	...	£7 10 0
10 x 8		12 x 10		15 x 12
£9 9 0	...	£12 0 0	...	£14 14 0

Extra Slides ... 9/6 14/6 £1 3 0 each.

SETS with Rectigraph Lens and See-Saw Shutter, in place of Instantograph Lens and Shutter:—

$\frac{1}{4}$		$\frac{1}{2}$		1
£4 5 6	...	£7 7 6	...	£9 17 6
10 x 8		12 x 10		15 x 12
£12 6 6	...	£15 6 0	...	£17 10 0

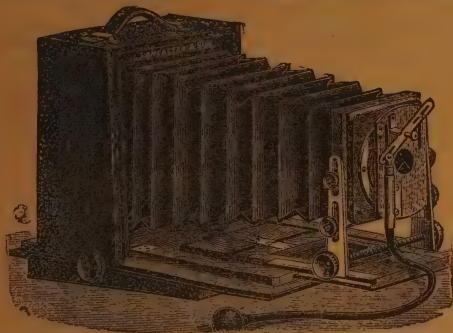


FOLDED.

COLMORE ROW, BIRMINGHAM.]

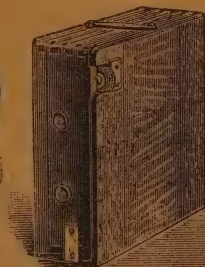
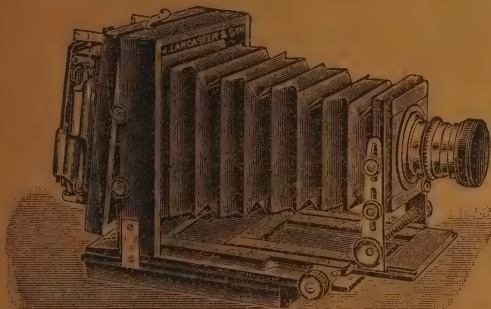
J. LANCASTER & SON, OPTICIANS,

THE
1903 FOLDING "INSTANTOGRAPH."



The Folding Instantograph has Double Swing Back, Rising Front, Best Lens, See-Saw Shutter, and Portable Stand.

The Camera is made of Mahogany and polished, as in woodcut below, or covered in Best Leather as above. Both forms close into the smallest possible compass, and although light, are very strong and durable.

**COMPLETE SETS.**

1/4 ... £2 2 0	1/2 ... £4 4 0	3/4 ... £6 6 0
Extra Slides ... 1/4 7/6	1/2 12/6	3/4 £1 0 0

COMPLETE SETS. For Negatives and Prints.

Sets including Camera, Lens, Shutter, Slide, and Stand, and a good supply of Chemicals, Plates, Sensitised Paper, Printing Frame, &c., &c.

1/4 ... £2 13 6	1/2 ... £5 7 6	3/4 ... £8 1 0
If with Rectigraph Lens and See-Saw Shutter in place of Instantaneous Lens and Shutter, Extra,		
1/4 ... £1 2 6	1/2 ... £1 17 6	3/4 ... £2 7 6

COLMORE ROW, BIRMINGHAM.

J. LANCASTER & SON, OPTICIANS,

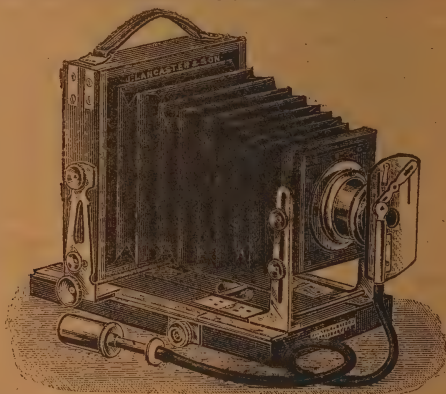
The 1903 Special Brass-bound Instantograph.

(PATENT.)

THIS is a New Camera made to meet the wishes of a number of Amateurs who have asked for a high-class Camera, Brass Bound, with Double Swing and Folding Tail-board closing over and protecting focussing glass when carrying.

VERY
COMPACT.

LIGHT AND
STRONG.



DOUBLE
SWING.

LONG
EXTENSION.

The Special Instantograph fulfils all these, and even more conditions. The Camera is of the best quality and finish, Brass Bound, Double Swing, Folding Tail-board, Patent Bellows, square and taper, Best Lens, with Patent See-Saw Shutter.

Each Set consists of Camera, Slide, Lens, Shutter, and Stand.

S 320	Price complete, for $\frac{1}{4}$ -plate	£2 10 0
" 322	" " " $\frac{1}{2}$ "	5 0 0
" 324	" " " $\frac{3}{4}$ "	7 10 0
" 325	" " " 10 x 8 plate	9 9 0
" 326	" " " 12 x 10 "	11 11 0
" 327	" " " 15 x 12 "	13 13 0

With Rectigraph Lens and See-saw Shutter in place of Instantograph Lens and Shutter.

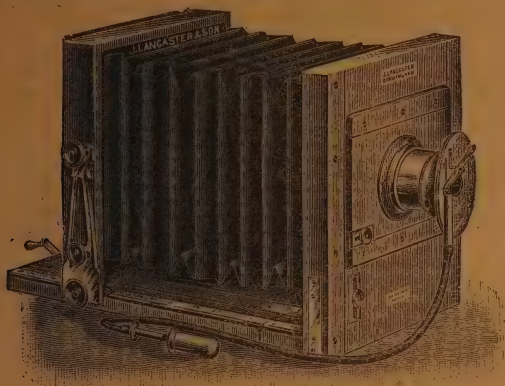
$\frac{1}{4}$	$\frac{1}{2}$	$\frac{3}{4}$	10 x 8	12 x 10	15 x 12
£3 12 6	£6 17 6	£9 17 6	£12 5 0	£15 0 0	£17 10 0
Extra Slides, Brass Bound.					
$\frac{1}{4}$	$\frac{1}{2}$	$\frac{3}{4}$	10 x 8	12 x 10	15 x 12
9/6	14/6	23/-	30/-	42/-	50/-

COLMORE ROW, BIRMINGHAM.

J. LANCASTER & SON, OPTICIANS,

The 1903 "International" Patent.

THIS is an excellent Apparatus, very compact, opening out to nearly three times the greatest length of Plate. It has a folding Tail-board, Patent Reversing Frame and Slide Holder, Double Swing, Rising and Cross Fronts, &c. The Lens is an Instantaneous one, with Patent Shutter and Patent Diaphragm, giving any aperture that may be required, and showing at a glance the diameter of Stop, ratio of aperture to focus, and speed of same. Ash Stand with Brass Top.



The INTERNATIONAL is a Camera which has given great satisfaction; it is strongly built, well put together, and in every way is a perfect Apparatus.

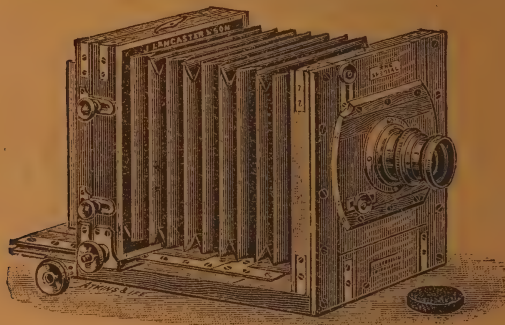
330	..	..	Price Complete	..	..	$\frac{1}{4}$ ($4\frac{1}{2} \times 3\frac{1}{4}$)	£2	10	0
331	..	..	"	"	..	5×4	4	0	0
332	..	..	"	"	..	$\frac{1}{2}$ ($6\frac{1}{2} \times 4\frac{1}{4}$)	5	0	0
333	..	..	"	"	..	$7\frac{1}{2} \times 5$	6	6	0
334	..	..	"	"	..	$\frac{1}{2}$ ($8\frac{1}{2} \times 6\frac{1}{2}$)	7	10	0
335	..	..	"	"	..	10×8	9	9	0
336	..	..	"	"	..	12×10	11	11	0
337	..	..	"	"	..	15×12	13	13	0

330A	Fitted with Rectigraph Lens and New Patent Shutter, in place of Instantaneous Lens and Shutter	$\frac{1}{4}$ ($4\frac{1}{2} \times 3\frac{1}{4}$)	£3	12	6
331A	Ditto	ditto	..	..	5×4 5 10 0
332A	Ditto	ditto	..	..	$\frac{1}{2}$ ($6\frac{1}{2} \times 4\frac{1}{4}$) 6 17 6
333A	Ditto	ditto	..	..	$7\frac{1}{2} \times 5$ 8 8 0
334A	Ditto	ditto	..	..	$\frac{1}{2}$ ($8\frac{1}{2} \times 6\frac{1}{2}$) 9 17 6
335A	Ditto	ditto	..	..	10×8 12 6 6
336A	Ditto	ditto	..	..	12×10 15 0 0
337A	Ditto	ditto	..	..	15×12 17 10 0

COLMORE ROW, BIRMINGHAM.

J. LANCASTER & SON, OPTICIANS,

LANCASTER'S "Improved Special '86" Camera. (Patent.)



BEST Quality Brass-Bound Folding Camera, extending to twice the ordinary length with Rackwork Adjustment, best Leather Bellows, Reversing Frame, Rising Fronts. The Focussing Slide moves in a Lateral direction, and the Dark Slide, instead of sliding in the usual way, is simply grooved to go on to a brass plate, and a movable plate in back of Camera fixes the Dark Slide in an Instant.

EACH CAMERA HAS DOUBLE SWING.

Camera and One Brass-bound Slide.

338	339	340	341	342	343
$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$
10x8	12x10	15x12	10x8	12x10	15x12
£2 10 0 ...	£4 0 0 ...	£5 0 0 ...	£5 0 0 ...	£7 0 0 ...	£8 0 0

Extra Dark Slides.

	12x6	17x6	25x8	30x8	42x10	50x12
Double Dry ...	12/6	17/6	25/-	30/-	42/-	50/-
Wet ...	10/-	15/-	21/-	25/-	40/-	45/-
Carriers ...	—	1/6	2/6	3/-	3/6	4/-

FIRST QUALITY SETS.

LANCASTER'S Special '86 Camera, Brass-Bound, Double Dry Slide, Instantaneous Lens with Patent Adjustable Diaphragms, Instantaneous Shutter, and best Mahogany Folding Stand, etc.

338A	339A	340A	341A	342A
$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$
10x8	12x10	15x12	10x8	12x10
£4 0 0 ...	£6 0 0 ...	£8 0 0 ...	£10 0 0 ...	£12 12 0

LANCASTER'S PATENT CAMERA, etc. etc., as above, but having Recti-graph Lens, and Lancaster's Patent "See-Saw" Shutter in place of Instantaneous Lens and Shutter. This is a perfect Camera and Lens.

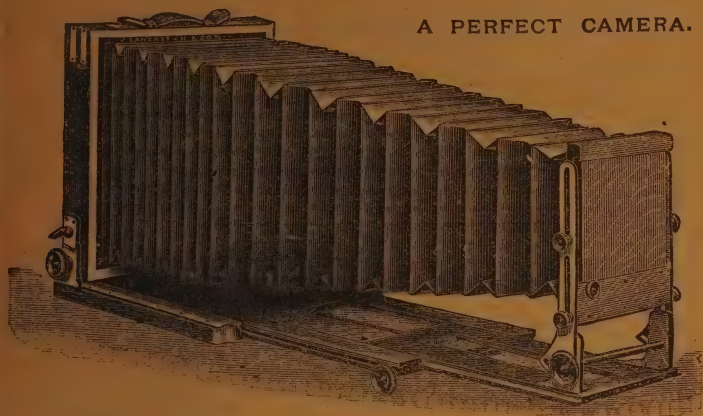
338B	339B	340B	341B	342B
$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$
10x8	12x10	15x12	10x8	12x10
£5 0 0 ...	£7 10 0 ...	£10 0 0 ...	£12 12 0 ...	£15 0 0

COLMORE ROW, BIRMINGHAM.

J. LANCASTER & SON, OPTICIANS,

Lancaster's "Extra Special" Camera.

A PERFECT CAMERA.



These are the Lightest, Longest, and most compact in the market.

THE "EXTRA SPECIAL" opens out to three times the length of plate, and closes to about two inches. It has Rack and Screw Adjustment, the Rack Adjustment commencing when Camera is closed, and Racks out to double extension; then the Screw Adjustment extends Camera to triple extension, giving fifty per cent. more extension than any other Camera extant.

Double Swing Back, Swing Front, Reversing Back, No Hinges.
Focussing Glass Protected, &c. Camera and Double Dry Slide.

	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{3}{4}$	10x8	12x10	15x12
£2 10 0 ..	£4 0 0 ..	£5 5 0 ..	£6 10 0 ..	£7 10 0 ..	£8 15 0	

Extra Slides, Brass Bound.

	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{3}{4}$	10x8	12x10	15x12
Double Dry ..	12/6 ..	17/6 ..	£1 5 0 ..	£1 10 0 ..	£2 2 0 ..	£2 10 0
Carriers ..	1/6 ..	2/6 ..	3/6 ..	4/6 ..	5/6 ..	6/6

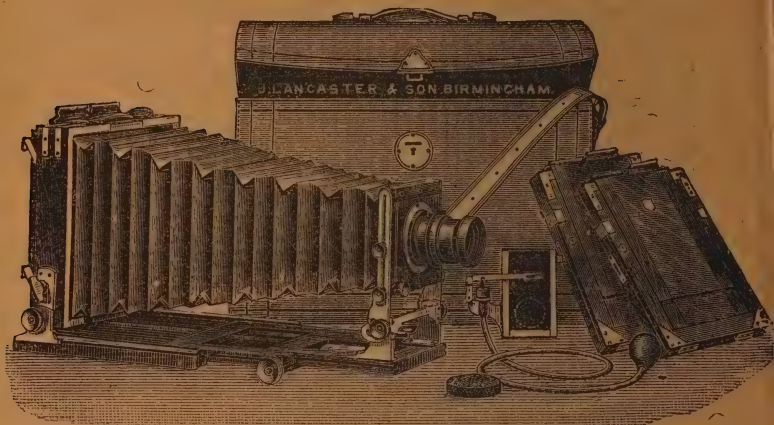
This Camera can be used with the shortest Wide Angle Lens, and will extend sufficiently far to be used even as an Enlarging Camera.

IT HAS GIVEN UNIVERSAL SATISFACTION.

COLMORE ROW, BIRMINGHAM.

J. LANCASTER & SON, OPTICIANS,

FIRST QUALITY SETS.



Lancaster's Extra Special Patent Camera. Brass-bound, Double Dry Slide, Instantaneous Lens, with Patent Adjustable Diaphragms, Instantaneous Shutter, and Best Mahogany Folding Stand, Leather-bound Case to carry Camera, Lens, and Slide, &c

Quarter.	Half.	Whole.	10×8	12×10	15×12
Ex. S. A.	Ex. S. A.	Ex. S. A.	Ex. S. A.	Ex. S. A.	Ex. S. A.
£1 4 0	£6 6 0	£8 8 0	£10 10 0	£12 12 0	£14 14 0

Lancaster's Patent Camera, &c., &c., as above, but having Rectigraph Lens and Lancaster's Patent See-Saw Shutter in place of Instantaneous Lens and Shutter. This is a perfect Camera and Lens.

Quarter.	Half.	Whole.	10×8.	12×10.	15×12.
Ex. S. B.	Ex. S. B.	Ex. S. B.	Ex. S. B.	Ex. S. B.	Ex. S. B.
£5 5 0	£7 17 6	£10 5 0	£12 15 0	£15 0 0	£18 0 0

FIRST QUALITY COMPLETE SETS,

INCLUDING :—

Lancaster's Extra Special Patent Camera, three Brass-bound Double Dry Slides, best Camera Stand, Rectigraph Lens, best Leather Case for Camera, Lens, Instantaneous Shutter and three Slides, Lancaster's Patent Ruby Lamp, three Ebonite Dishes, Plates, Scales and Weights, Measures, Vignette Glass, Printing Frame, Cutting Shapes, Light-tight Plate Box, Compound Focuser, Sensitised Paper, and large stock of Chemicals in stoppered Bottles, &c.

Quarter.	Half.	Whole.	10×8.	12×10.	15×12.
Ex. S. C.	Ex. S. C.	Ex. S. C.	Ex. S. C.	Ex. S. C.	Ex. S. C.
£8 8 0	£12 12 0	£16 16 0	£21 0 0	£25 0 0	£30 0 0

COLMORE ROW, BIRMINGHAM.

J. LANCASTER & SON, OPTICIANS,

THE "Amateur's" Camera.



THE AMATEUR'S COMPLETE OUTFIT consists of Mahogany Camera with Folding Tailboard and Patent Reversing Back, Best Lens, 3-fold Stand, Chemicals, Plates, Dishes, Patent Folding Ruby Lamp, Printing Frame, Sensitised Paper, Toning and Fixing Solutions, Cards, Cutting Shape, &c., &c., with Book of Instructions, in Polished Box with Lock and Key.

PRICES COMPLETE.

$\frac{1}{4}$ $4\frac{1}{2} \times 3\frac{1}{2}$	$\frac{1}{2}$ $6\frac{1}{2} \times 4\frac{1}{2}$	$\frac{3}{4}$ $8\frac{1}{2} \times 6\frac{1}{2}$	10×8	12×10
£2 10 0	£3 4 0	£6 0 0	£7 10 0	£9 0 0

EXTRA SLIDES.

	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{3}{4}$	10×8	12×10
Double Dry	5/6	10/6	18/-	25/-	35/-
Wet	5/-	10/-	16/-	21/-	30/-
Carriers	1/6	2/6	3/-	3/6	

The Carriers hold two plates, and are sent out to hold the next size smaller plate; thus $\frac{1}{4}$ -plate Carrier at 1/6 holds two $\frac{1}{8}$ -plates, the $\frac{1}{2}$ -plate holds two $\frac{1}{4}$ -plates, and so on, but carriers may be had for any of the smaller plates at the above prices.

COLMORE ROW, BIRMINGHAM.

J. LANCASTER & SON, OPTICIANS,
 THE 1903 MODEL
"LADIES' " CAMERA.
 (PATENT.)

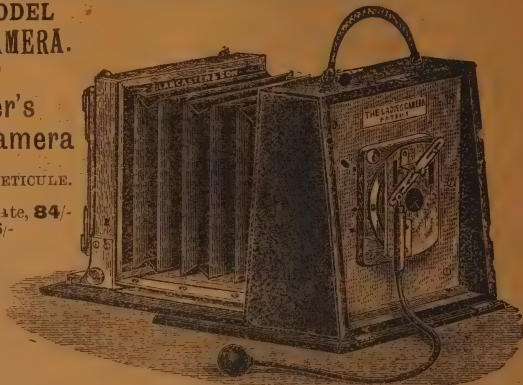
Lancaster's
"Ladies'" Camera
 (PATENT.)

Folding up like a RETICULE.

$\frac{1}{4}$ plate, 42/- $\frac{1}{4}$ plate, 84/-
 $\frac{1}{2}$ plate, 126/-

Consists of Camera,
 Double Dry Slide,
 Lens, Shutter and
 Stand.

Extra Slides, $\frac{1}{4}$ 7/6
 $\frac{1}{2}$ 12/6 $\frac{3}{4}$ 20/-



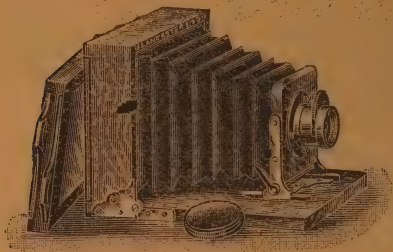
This Apparatus has been specially designed for Ladies. It is entirely free from complications, and, although strong, yet is extremely light and portable.

Lancaster's Boy's Own Camera.

THE 1903

BOY'S OWN CAMERA

Is a Mahogany Camera, with
 Kinnear Bellows, excellent
 Lens, and Double Slide.



Quarter-plate ... £0 10 6
 Half-plate ... £1 1 0
 Whole-plate ... £3 3 0

Instantaneous Shutter ... 2/6 extra. | Camera Stand ... 2/6 extra.

The Boy's Own Complete Sets.

Consisting of Camera, Lens, Stand, Double Dark Slide, &c., Ruby Lamp, Printing Frame, Dishes, Plates, Chemicals for Negatives and Prints, P.O.P., &c., all fitted in Travelling Case with Straps, and Book of Instruction.

COMPLETE SETS FOR NEGATIVES AND PRINTS:

Quarter-plate, £1 1 0 Half-plate, £2 2 0 Whole-plate, £3 3 0

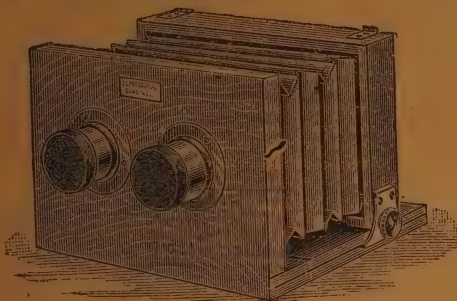
COLMORE ROW, BIRMINGHAM.

J. LANCASTER & SON, OPTICIANS,

Stereoscopic Cameras.

BEST LENSES

RAPID OR SLOW AT WILL.

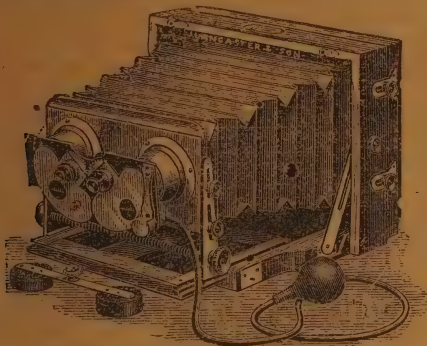


CAMERAS, BEST MAKE.

PORTABLE.

Stereo Merveilleux.

- 419 The Stereo Merveilleux consists of a well-made Mahogany Camera, with one Double Slide, pair of good Lenses and Camera Stand .. £2 2 0
- 420 The Stereo Meritoire, much superior 3 3 0

**Stereo Instantograph.**

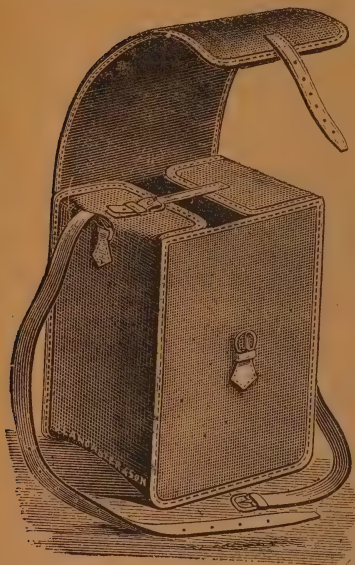
- 421 The Stereo Instantograph is a most excellent apparatus with Instantaneous Shutter, best Lenses and Stand; the Slide measures $6\frac{1}{2} \times 3\frac{1}{2}$ £4 4 0
- 422 The Stereo Instantograph, with an arrangement for taking plates $7\frac{1}{4} \times 4\frac{1}{2}$ and smaller plates, and extra bellows for Stereo work; a splendid Camera for general work 5 5 0

Rectigraph Lenses, fitted to 421 and 422. £2 2 0 extra.

Double Dry Slides, 419 and 420. 10 6; 421, 12 6; 422. 15/- each.

COLMORE ROW, BIRMINGHAM.

J. LANCASTER & SON, OPTICIANS,

CASES FOR CAMERAS.**The Leather-Bound Case.**

A WELL-MADE CASE TO
CARRY CAMERA, LENS, AND THREE
SLIDES.

$\frac{1}{2}$, 7/6; $\frac{1}{2}$, 10/6; $\frac{1}{2}$, 15/-; 10x8, 21/-;
12x10, 25/-; 15x12, 30/-.

These Cases are strong, and are lined
with Green Baize.

Waterproof Cases.

WITH SHOULDER STRAPS.

$\frac{1}{2}$, 5/-; $\frac{1}{2}$, 7/6; $\frac{1}{2}$, 10/-; 10x8, 12/6;
12x10, 15/-; 15x12, 17/6.

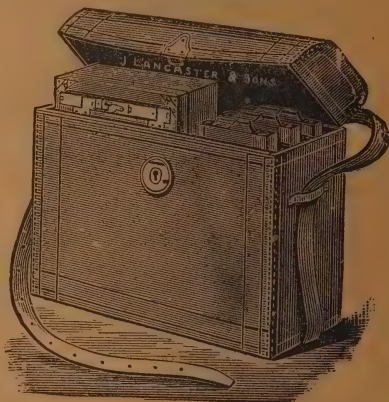
Second Quality— $\frac{1}{2}$, 2/6; $\frac{1}{2}$, 3/9; $\frac{1}{2}$, 5/6.

Best Leather Cases.

$\frac{1}{2}$, 17/6; $\frac{1}{2}$, 25/-; $\frac{1}{2}$, 35/-; 10x8, 42/-;
12x10, 45/-; 15x12, 50/-.

These are made out of the best hide,
lined with velvet; with partitions to carry
Camera, Lens, three Slides, Tailboard,
etc., Nickel-plated Lock and Key, Hand
and Shoulder Straps.

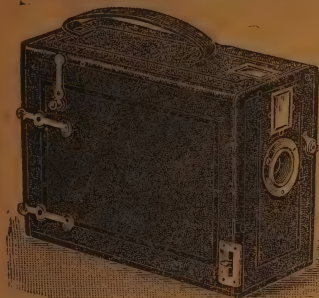
OTHER SIZES MADE TO ORDER.



COLMORE ROW, BIRMINGHAM.

J. LANCASTER & SON, OPTICIANS,

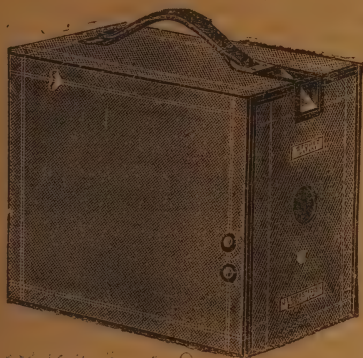
The "Boy's Own" 1903 Hand Cameras



The "Boy's Own" 5s. Hand Camera.

This is an excellent Hand Camera, taking six plates or films $3\frac{1}{2} \times 2\frac{1}{2}$ in. It has an achromatic lens, with time and instantaneous shutter.

Price complete	...	...	...	...	...	...	...	£0	5	0
Ditto, ditto, with plates, P.O.P., printing-frame, and chemicals	...	...	...	...	...	...	...	0	10	6



The "Boy's Own" 7/6 Hand Camera.

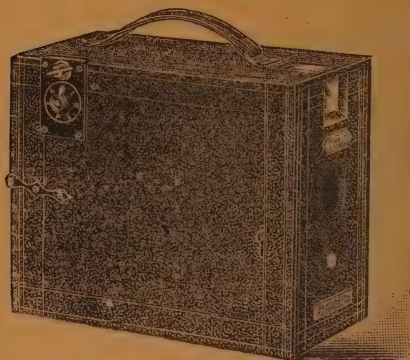
This is a quarter-plate Camera, carrying six plates or films, with a superior lens, and time and instantaneous shutter.

Price complete	...	...	...	...	...	...	...	£0	7	6
Ditto, ditto, with plates, P.O.P., printing-frame, and chemicals	...	...	...	...	...	...	...	0	15	0

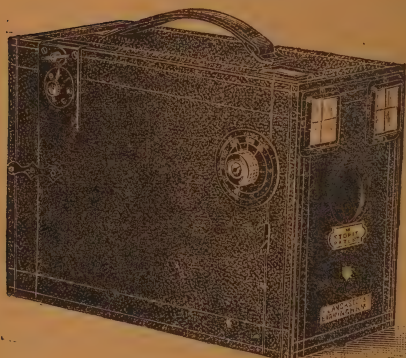
COLMORE ROW, BIRMINGHAM.

J. LANCASTER & SON, OPTICIANS,

LANCASTER'S NEW "STOPIT."



No. 1 "STOPIT."



No. 2 & 3 "STOPIT."

LANCASTER'S 1903 "STOPIT" is the cheapest, best, and most compact Hand Camera extant. No. 1 carries six films or plates, and is fixed focus; No. 2 carries six films or plates, and has rack focussing adjustment and divided scale; No. 3 carries twelve films or plates, and has rack adjustment, &c. The lenses are all of the finest quality, giving perfect definition, so different to the common German and French lenses used in so many Hand Cameras.

This year's "STOPIT" is much improved over original model; it has Plate Indicator showing how many films or plates have been exposed, and also large Brilliant Finders.

PRICES.

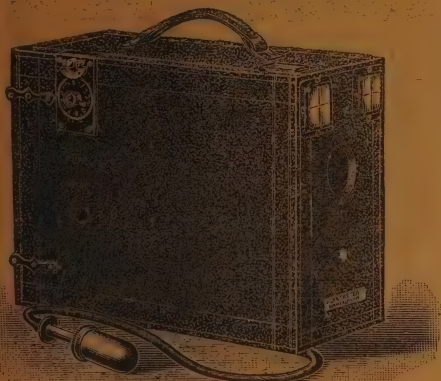
$\frac{1}{4}$ plate.—No. 1, 10/6	No. 2, 15/-	No. 3, 21/-
$\frac{1}{2}$ plate.—No. 4, 21/-	No. 5, 30/-	No. 6, 42/-

COLMORE ROW, BIRMINGHAM.

J. LANCASTER & SON, OPTICIANS,

LANCASTER'S Up-to-Date Omnigraphs.

OVER 30,000 SOLD.



C OMNIGRAPH.

The 1903 OMNIGRAPH is an excellent Camera, containing all modern improvements, best quality lens, with Patent Shutter.

The 1903 C OMNIGRAPH is a new model Hand Camera, carrying 12 films or plates; it is covered in cloth and has Patent Sec-Saw Shutter, Time and Instantaneous Exposures, with Pump Release.

$\frac{1}{4}$, 21/-; 5×4 , 31/6;

$\frac{1}{2}$, 42/-

The 1903 L OMNIGRAPH also carries 12 films or plates; has covered Finder, Rackwork Adjustment for focussing, and Iris Diaphragm; the Camera is covered in leather.

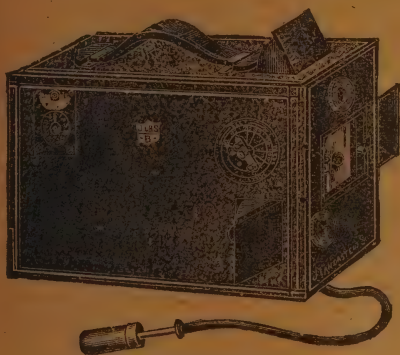
$\frac{1}{4}$, 31/6; 5×4 , 45/-;

$\frac{1}{2}$, 63/-

The 1903 R L OMNIGRAPH has Rectilinear Lens, with "Iris" Shutter for Time or Instantaneous, and carries 12 films or plates.

$\frac{1}{4}$, 42/-; 5×4 , 63/-;

$\frac{1}{2}$, 84/-



L OMNIGRAPH

COLMORE ROW, BIRMINGHAM.

J. LANCASTER & SON, OPTICIANS,

Lancaster's Stereo Omnigraph.

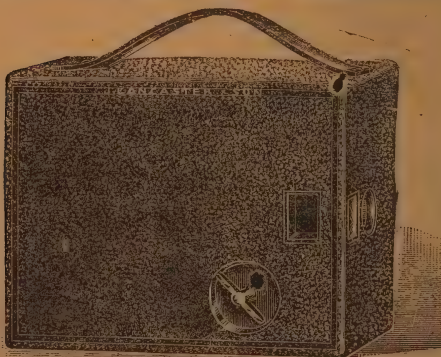
Lancaster's
Stereo
Omnigraph

is an excellent Hand
Camera for Stereoscopic
work, and carries Six
Plates in Changing
Box.



Cloth-covered "Stereo Omnigraph"	£2 2 0
Leather Covered "Omnigraph"	3 3 0
" " " with Rectilinear Lenses and Shutter	5 5 0

Lancaster's "Kapawl Camera."



LANCASTER'S "Kapawl"
Hand Camera is a very
neat Apparatus, beauti-
fully finished, and de-
signed to carry a roll of
films for 12 exposures.
The Camera is con-
structed with the Spool
Spindles on either side of
the front portion of the
Camera, and the Film is
unwound from the Cart-
ridge on one Spool, and
carried round to the
empty spindle on the
opposite side. The Lens
is of excellent quality
with new Time and In-
stantaneous Shutter and
Daylight Finder. The
outer covering is of fine
quality leather, with a
strong handle attached.
It is made in two sizes,
for pictures $3\frac{1}{2} \times 2\frac{3}{4}$, and
 $4\frac{1}{2} \times 3\frac{1}{4}$. The lightness and

small dimensions of the Camera make it most attractive for Ladies, Cyclists, and Tourists generally.

"KAPAWL" No. 1.—For Twelve Pictures. $3\frac{1}{2}$ in. \times $2\frac{3}{4}$ in. ...	£1 1 0
"KAPAWL" No. 2.—" " " $4\frac{1}{2}$ in. \times $3\frac{1}{4}$ in. ...	1 11 6

COLMORE ROW, BIRMINGHAM.

J. LANCASTER & SON, OPTICIANS,

LANCASTER'S PERFECT

HAND, MAGAZINE, OR DETECTIVE CAMERA

The "ROVER."

(Patent.)

No. 388.

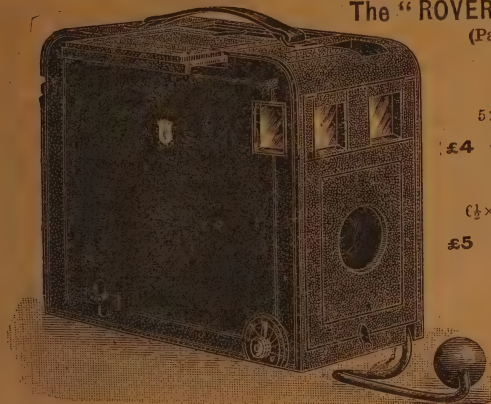
COMPLETE,

 $3\frac{1}{2} \times 3\frac{1}{2}$

£2 12 6

 $4\frac{1}{2} \times 3\frac{1}{2}$

£3 3 0

 5×4

£4 0 0

 $6\frac{1}{2} \times 4\frac{1}{2}$

£5 5 0

THE "Rover" is one of the most perfect cameras ever put on the market; it consists of practically three chambers: (A) a space on top holding twelve Plates or Films in our new Patent Sheaths or Carriers; (B) the Camera proper, and (C) a space at back to hold twelve plates after exposure. Each chamber is light-proof, and only one plate is in Camera at time of exposure.

The 1903 "Rover" has been remodelled, and has best quality Lens, with Patent "Iris", Shutter, Two Brilliant Finders, Rack Adjustment, with Distance Scales, &c.

PRICES.

No. 1 "Rover" covered in good quality Leatherette—

 $8\frac{1}{2}$ in. sq., £2 2 0 $\frac{1}{2}$ -pl., £2 12 6 $\frac{1}{4}$ -pl., £3 15 0

No. 2, Finest Quality "Rover," covered in best Leather—

 $8\frac{1}{2}$ in. sq., £2 12 6 $\frac{1}{2}$ -pl., £3 3 0 $\frac{1}{4}$ -pl., £5 5 0

If with Rectigraph Lens in place of Instantaneous Lens,
extra cost—

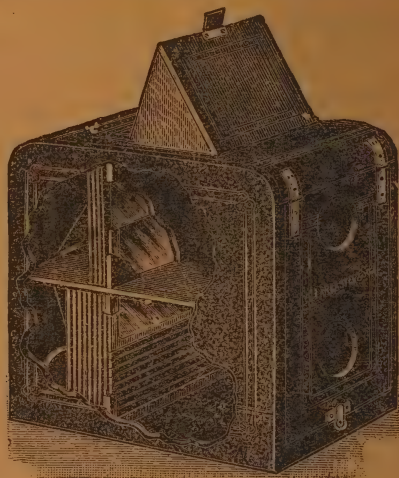
 $8\frac{1}{2} \times 3\frac{1}{2}$ in., or $\frac{1}{2}$ -pl., £1 2 6 5×4 -pl., £1 10 0 $\frac{1}{4}$ -pl., £1 17 6

COLMORE ROW, BIRMINGHAM.

J. LANCASTER & SON, OPTICIANS,

LANCASTER'S LATEST HAND CAMERA.

Full-size Finder used during Exposure.



Simplest possible Changing motion.

THE "ZOEGRAPH" (Patent).

THIS is a New Hand Camera, carrying Twelve Plates or Films in special Metal Carriers, which are carried in the lower half of Camera, and after exposure, by a simple movement of Venetian shutter, are carried into the upper half. The Lens is a very rapid one, of latest construction, with best Shutter, &c. The Finder is full size of Plate, and has a Cover which only allows a small aperture for viewing image through, thus giving a bright, full-sized image of object the moment of exposure.

"Zoograph," complete, 1 plate.	£3 3 0
" " " 2 " "	5 5 0

"POCKET ZOEGRAPH."

POCKET ZOEGRAPH, carrying Twelve Films, $2\frac{1}{2}$ in \times $1\frac{1}{2}$ in., made to carry in the pocket. A complete instrument, with special Lens and Ever-set Shutter and Daylight Finder.

To carry Twelve Films, $3\frac{1}{4}$ \times $2\frac{1}{4}$ in.	£1 11 6
---	---------

RAPID FILMS.

$3\frac{1}{4}$ in. \times $2\frac{1}{4}$ in.	1/6 per dozen.
--	----------------

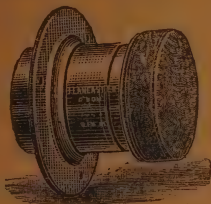
COLMORE ROW, BIRMINGHAM.

J. LANCASTER & SON, OPTICIANS,

LENSES.

MESSRS. LANCASTER & SON again have pleasure in recording the fact that during the last twenty years they have sold over 350,000 of their Lenses, and have received the most flattering testimonials as to their high quality.

MESSRS. LANCASTER & SON to see that every Lens is stamped name engraved upon it in full. Flint and Crown, and do not send most stringent testing. These their manufacture.



No. 374.

LANDSCAPE LENSES.

Mounted in Brass with Sliding Tubes. The Lenses are of the Meniscus form, giving perfect definition from centre to margin.

Size $\frac{1}{4}$ $\frac{1}{2}$ $\frac{3}{4}$ $1\frac{1}{2}$ 10×8 12×10 15×12
Focus $5\frac{1}{2}$ in. 9 in. 12 in. 16 in. 20 in. 24 in.
Price 5/- 10/- 15/- 20/- 25/- 30/-



No. 376 N.A.

NARROW ANGLE LENS.

(Patent.)

This is an excellent Lens for narrow Angle work, giving superb definition.

Size $\frac{1}{4}$ $\frac{1}{2}$ $\frac{3}{4}$ $1\frac{1}{2}$ 10×8 12×10
Focus 8 in. 12 in. 18 in. 21 in. 24 in.
Price 12/6 21/- 30/- 42/- 50/-

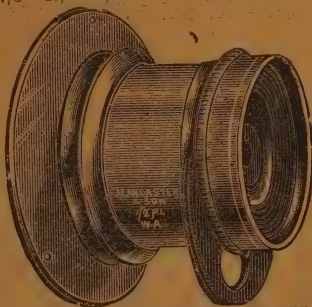


No. 375.

SUPERIOR LENSES.
IN RACKWORK MOUNTS.

Same Focus as No. 374.

$\frac{1}{4}$ $\frac{1}{2}$ $\frac{3}{4}$ $1\frac{1}{2}$ 10×8 12×10 15×12
7/6 15/- 22/6 30/- 37/6 45/-



WIDE ANGLE LENSES. No. 377.

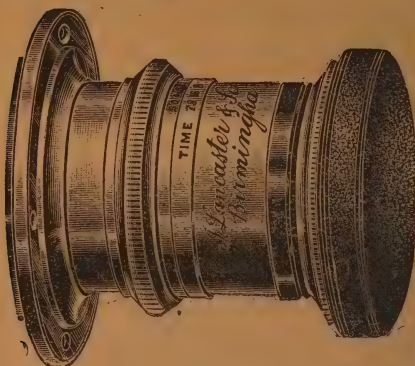
These Lenses are very useful in confined situations, and for copying full size in an ordinary camera. The focus of each is given below.

Size $\frac{1}{4}$ $\frac{1}{2}$ $\frac{3}{4}$ $1\frac{1}{2}$ 10×8 12×10
Focus 4 6 8 10 12 in.
Price 10/6 15/- 21/- 25/- 30/-

COLMORE ROW, BIRMINGHAM.

J. LANCASTER & SON, OPTICIANS,

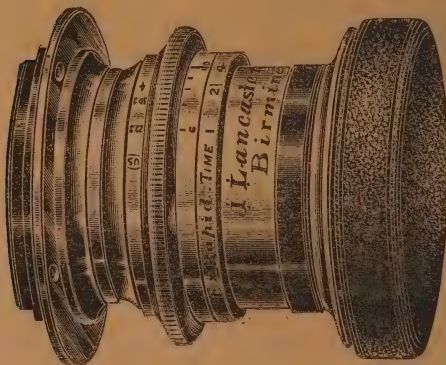
THE RECTIGRAPH SERIES.



No. 376.

Silver Ring Rapid Rectigraph with Patent Adjustable Diaphragms.

Diam. of Lens	$1\frac{1}{2}$	$1\frac{3}{8}$	$1\frac{1}{2}$	10×8	12×10	15×13
Focus	5½-in.	8½-in.	11½-in.	2½	2½	2½
Price	40/-	60/-	80/-	11-in.	18-in.	21-in.
Leather cases, lined Silk, to carry Rectigraph..	26	3/-	36	100/-	120/-	140/-
				4/-	46	5/-



No. 376 A L.

Gilt Band Aluminium
Mounted
EXTRA RAPID
RECTIGRAPH,
Working at F 6.

In Leather Case.

A Superb Lens.
Mounted in Aluminium
Finest Quality

50/- 75/- 100/-

COLMORE ROW, BIRMINGHAM.

J. LANCASTER & SON, OPTICIANS,

LANCASTER'S
RECTIGRAPH LENSES.

376 W.A.

RECTIGRAPH.



THESE Lenses are symmetrical, and when used either together as a Wide Angle Combination, or singly as a Narrow Angle Lens, the definition is perfect. The foci of Combination and Back Lens are both given below.

Mounted in Best Metal with Silver Ring.

	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{3}{4}$	10×8	12×10	15×12	22×13
Focus of Wide Angle Rectigraph	$3\frac{1}{2}$	6	6	8	10	13	17 in.
Focus of Back Lens	7	10	12	18	22	27	35 in.
Price ...	30/-	42/-	50/-	63/-	70/-	80/-	120/-
Mounted in Aluminium ...	36/-	50/-	60/-	75/-	85/-	—	—

The graduations on Scale are for the Combination, and when using Back Lenses they must be doubled.

◆◆◆◆◆◆◆◆

COMBINATION RECTIGRAPH.

(PATENT.)

THESE Lenses are of the Highest quality, great care being taken in their construction.

THE COMBINATION RECTIGRAPH can be used as a Wide, Ordinary, and Narrow Angle Lens, the different foci being given below.



Combination Rectigraph Lens.

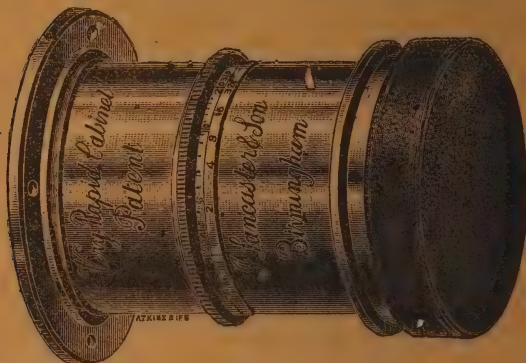
	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{3}{4}$	10×8	12×10	15×12
Focus of Combination	$3\frac{1}{2}$	$4\frac{1}{2}$	$6\frac{1}{2}$	8	9	10 in.
" Front Lens	5	8	10	12	14	16 in.
" Back Lens	9	12	18	20	24	30 in.
Price ...	30/-	42/-	50/-	70/-	90/-	110/-
Mounted in Aluminium	36/-	50/-	60/-	80/-	105/-	—

The Scale has three sets of Graduations:—First, for Combination; Second, for Front Lens only; Third, for Back Lens only.

COLMORE ROW, BIRMINGHAM.

J. LANCASTER & SON, OPTICIANS.

PORTRAIT LENSES.



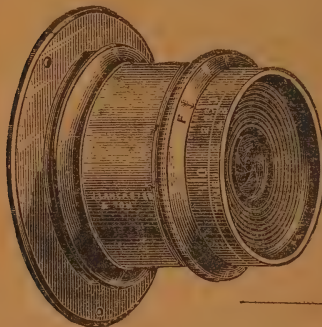
No. 381B.

Series A.—Giving excellent Definition.

379A CARTE LENS, with Iris Diaphragms, Excellent Working Lens	..	£1	10	0
380A CABINET LENS, ditto	ditto	..	3	3 0
FULL PLATE PORTRAIT LENS, ditto	ditto	..	5	5 0
12 x 10 ditto	ditto	..	12	12 0

Series B.—Giving Superb Definition, with great Rapidity of Action.

381B VERY RAPID CARTE LENS, with Iris Diaphragms	..	£3	15	0
382B VERY RAPID CABINET LENS, with Iris Diaphragms	..	5	10	0
382B Ditto ditto ditto Full Plate	..	10	0	0
384B Ditto ditto ditto 12 x 10	..	18	18	0



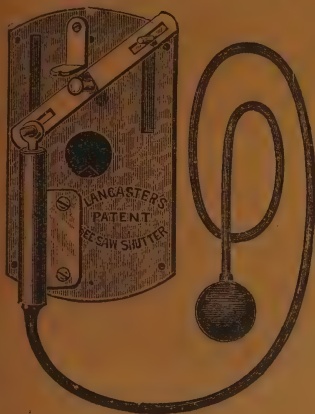
LANCASTER'S PATENT INSTANTANEOUS LENSES for Groups, Portraits, Landscapes or Architectural Work, with Patent Shutter and Patent Adjustable Diaphragm.

Size	..	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{3}{4}$	10x8	12x10
Focus	..	5 $\frac{1}{2}$	8 $\frac{1}{2}$	11	14	17
Price	..	21/-	30/-	42/-	52/6	63/-
Mounted in						
Aluminium		25/-	37/6	52/6	—	—

COLMORE ROW, BIRMINGHAM.

J. LANCASTER & SON, OPTICIANS,

Lancaster's Shutters.

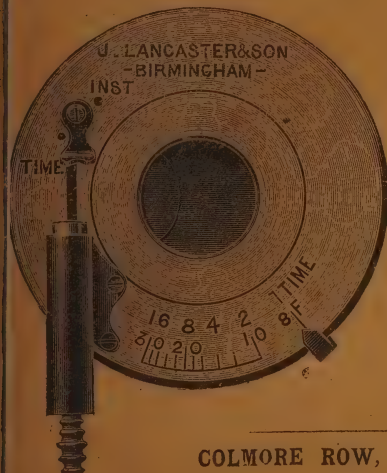


"See-saw" Shutter.

The Shutter opens and closes in the centre, and consists of two plates moving across each other perfectly smooth and without any vibration. They are moved by means of a cylinder and piston connected with a beam or "see-saw" arrangement, which moves both together. There is a small lever at the top of shutter, which, when pulled down, allows shutter to open only, and on release of pressure on pump, to close; by turning lever upwards, the shutters shoot across at a high speed, regulated by pressure on pump.

Prices Complete.

	Nos. 1.	2.	3.	4.
				10×8
	$\frac{1}{4}$ -pl.	$\frac{1}{2}$ -pl.	$\frac{3}{4}$ -pl.	or $\frac{1}{4}$ -pl. $\frac{1}{2}$ -pl.
Diameter of Aperture	$\frac{1}{4}$ -in.	$\frac{1}{2}$ -in.	1-in.	1 $\frac{1}{2}$ -in.
Form A	5/-	6/6	8/6	10/6
" B	5/-	6/6	8/6	—
C—Ever-set Shutter with Iris Diaphragm	6/6	7/6	10/6	—
Aluminium "See-saw" Shutters	7/6	10/6	12/6	15/-



New Model Ever-set "Iris" Shutter.

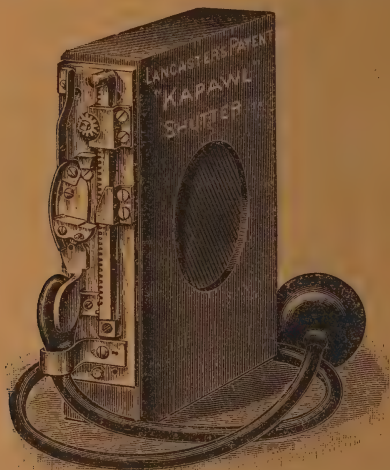
For time and instantaneous exposure of varying speeds, with release and Iris Diaphragm.

$\frac{1}{4}$ -plate with $\frac{1}{4}$ -in. aperture	5/-
$\frac{1}{2}$ " " $\frac{1}{2}$ -in. " "	7/6
$\frac{1}{4}$ " " 1-in. " "	10/6
$\frac{1}{8}$ " " 1 $\frac{1}{2}$ -in. " "	12/6
1-in. aperture for $\frac{1}{4}$ R.R. Lenses	11/6
1 $\frac{1}{2}$ -in. " " $\frac{1}{2}$ " " "	13/6

COLMORE ROW, BIRMINGHAM.

J. LANCASTER & SON, OPTICIANS,

LANCASTER'S "KAPAWL" SHUTTER.



LANCASTER'S "KAPAWL" SHUTTER is on the Roller Blind System. The Shutter is set by means of a rack and pinion movement. The action of raising the rack to full extent sets the Shutter, and release is actuated by the ball and tube method. Tinted, as well as instantaneous, exposures can be made, and in order to obtain a prolonged exposure a simple stop is moved into position, which stops the rack in its downward course about midway, and keeps the Shutter open until pressure of hand upon the ball is released, when the stop automatically moves on one side and allows rack to fall to bottom and close aperture. A speed indicator for speeds varying from $\frac{1}{25}$ th to $\frac{1}{100}$ th of a second is fitted, and the whole of the working parts are well and substantially made, and not likely to get out of order.

PRICES, including Speed Indicator.

								S.	D.
1½ in. diameter	...	...	...	...	...	...	...	12	6
1¾ in.	31	...	...	...	...	...	...	13	6
2 in.	33	...	...	...	...	...	...	15	0
2¼ in.	35	...	...	...	...	...	...	16	0
2½ in.	37	...	...	...	...	...	...	18	0

COLMORE ROW, BIRMINGHAM.

J. LANCASTER & SON, OPTICIANS,

Portable Camera Stands, &c.

HEAD RESTS.

French Polished
Head Rests to
attach to Chair,
with Adjusting
Screws,
5/-

Ditto, with Uni-
versal Motions,
10/6

Iron Head Rests,
£1 10 0



369.—Lancaster's New Camera Stand may be used in any and every imaginable position.

$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	10x8	12x10
12/6	15/-	17/6	21/-	25/-

370.—The Ladies' Three-Fold Stand. This forms a most compact stand, folding into a little over half the usual size.

$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	10x8	12x10
6/6	10/-	12/6	15/-	21/-

370.—THE LADIES' THREE-FOLD STAND.



CASES FOR STANDS.

Leather-bound Cases, with Lining, to carry Stands in.

$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	10x8	12x10
3/-	4/-	5/-	6/-	7/-

COLMORE ROW, BIRMINGHAM.

J. LANCASTER & SON, OPTICIANS,

Camera Stands, &c.



365—Pillar Studio Stand.

366—Studio Stand with Rack Adjustment.

STUDIO CAMERA STANDS.

	$\frac{1}{2}$	$\frac{3}{4}$	$\frac{1}{2}$	10x8	12x10
365—Studio Stand ..	10/6	15/-	21/-	25/-	30/-
366—Studio Stand with Rack Adjustment ..	21/-	25/-	30/-	42/-	52/6
367—Lancaster's International Stand ..	7/6	12/6	15/-		
368—Lancaster's New Stand, with Patent Universally Adjusting Top, giving any position to Camera, and with Adjustable Legs.					
	$\frac{1}{2}$, 10/6 ; $\frac{3}{4}$, 15/- ; $\frac{1}{2}$, 21/- ; 10x8, 25/- ; 12x10, 30/- ; 15x12, 35/-.				



WATERPROOF CASES FOR STANDS.

 $\frac{1}{2}$, 3/- ; $\frac{3}{4}$, 4/- ; $\frac{1}{2}$, 5/- ; 10x8, 6/- ; 12x10, 7/-.

COLMORE ROW, BIRMINGHAM.

J. LANCASTER & SON, OPTICIANS,

LANCASTER'S**New Portable Lantern Stand.**

THE Portable Lantern Stand is a very useful and steady Stand for either Single or Double Lantern, and so constructed with Top Chamber, lined with cloth, carrying 3 Boxes of 50 Slides each (in all 150 Slides), with hinged side opening next to operator, and being rigidly clamped, forms a convenient Table for Slides.

Above the Slide Chamber is a tilting-board for Lantern, which can be clamped by front screws to any height, so as to fix Lantern at any required angle.

The Stand has an adjusting arrangement giving varying heights from the floor, thus doing away with the necessity of any other support, and saving Exhibitor the trouble of providing Table, etc.

PRICES.

21/- 25/- 30/- each

ACCORDING TO FINISH.

COLMORE ROW, BIRMINGHAM.

J. LANCASTER & SON, OPTICIANS,

RETOUCHING
DESK,

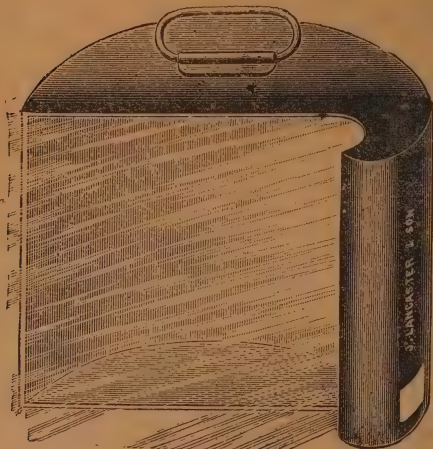
LANCASTER'S AMATEUR'S

Retouching Desk.Folding into small compass, fitted
with two Retouching Pencils,
with side wings.

$\frac{1}{2}$ -plate ..	5/-	$\frac{1}{2}$ -plate ..	7/6
$\frac{1}{4}$ -plate ..	10/6	10x8 ..	15/-
12x10 ..			21/-

Retouching DesksIN POLISHED MAHOGANY OF
HIGHEST FINISH.

$\frac{1}{2}$ -plate ..	18/6	$\frac{1}{2}$ -plate ..	15/-
$\frac{1}{4}$ -plate ..	18/-	10x8 ..	22/6
12x10 ..			30/-

**Paraboloid
Enlarging
Lamp.**

THIS Lamp is cut out of a Paraboloid, and burns Magnesium Ribbon in one side, the light being distributed over the whole of the Plate from centre to corner, giving crisp, clean, and perfect Enlargements. For ordinary work about 4 ins. of Ribbon is ample.

PRICES.

To cover $\frac{1}{2}$ -plate ..	5/-
" $\frac{1}{4}$ -plate ..	7/6
" $\frac{1}{2}$ -plate ..	10/-

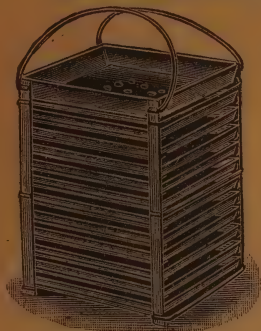
COLMORE ROW, BIRMINGHAM.

J. LANCASTER & SON, OPTICIANS,

THE
"Perfectum" Washer.

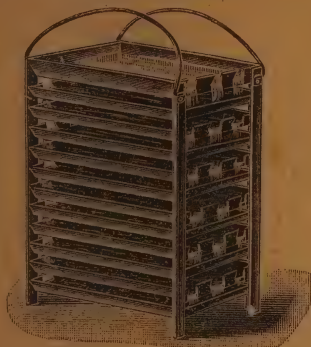
A PERFECT AND SIMPLE WASHER.

Total elimination of Hypo.

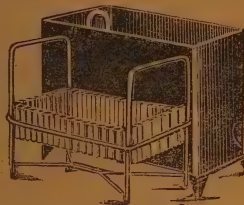
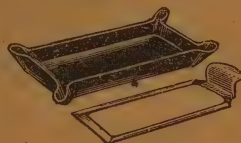
PRICES FOR
12 PLATES.—
1/4-plate, 6/6—
1/2-plate, 9/6—
3/4-plate, 12/6

LANCASTER'S

New Drip-Drop Washer.

Giving a continuous flow from top to bottom
over alternate ends.

1-pl. .. 5/-	1-pl. .. 7/6	whole-pl. .. 10/6
10x8 .. 15/-	12x10 .. 21/-	

Lancaster's
Syphon Washer.1/4-plate, 2/6; 1/2-plate, 3/6;
3/4-plate, 5/-Lancaster's
Developing Folding
Carrier.1/4-plate, 6d.; 5x4, 9d.;
1/2-plate, 10d.Lancaster's
Adjustable Rack.

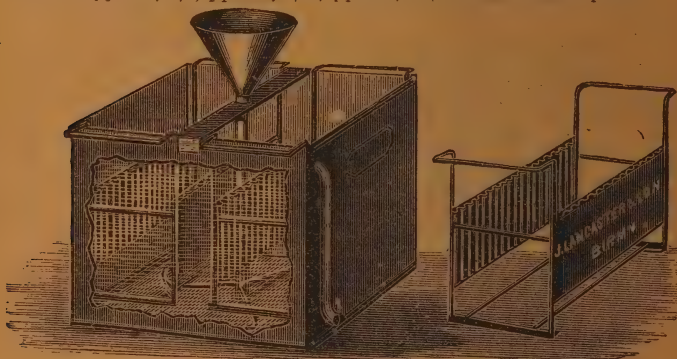
For 1/4, 1/2, or 3/4-plate, 2/-

COLMORE ROW, BIRMINGHAM.

J. LANCASTER & SON, OPTICIANS,

LANCASTER'S "HIERO" WASHER.

FOR NEGATIVES AND PRINTS.

For 26 $\frac{1}{4}$ -plates, 5/-; $\frac{1}{2}$ -plates, 7/6; $\frac{3}{4}$ -plates, 10/6. Each holds 26 plates.

THE "HIERO" WASHER consists of a square metal vessel, japanned outside and enamelled inside. It has two racks to hold the plates, which may be used as dryers. The water enters through funnel and passes down centre tube and out of the bent ends, thus causing the funnel and tubes to rotate; this gives a supply of water under the whole of the plates, and keeps up a continuous circulation, the waste being emptied periodically by the Syphon on side.

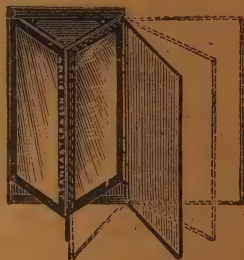
**RUBY LAMPS.**

LANCASTER'S RUBY LAMP, with two Shades of Ruby Glass and Oil Burner, 2/-

LANCASTER'S SELF-FEEDING CANDLE LAMP, with two Shades of Ruby Glass, 3/-

Lancaster's Patent Folding Lamp.

With two Shades of Ruby Glass, so arranged that the lighter ruby can be completely cut off until development has been nearly completed. The lamp packing, when closed, is in $\frac{7}{8}$ in., 5/-.

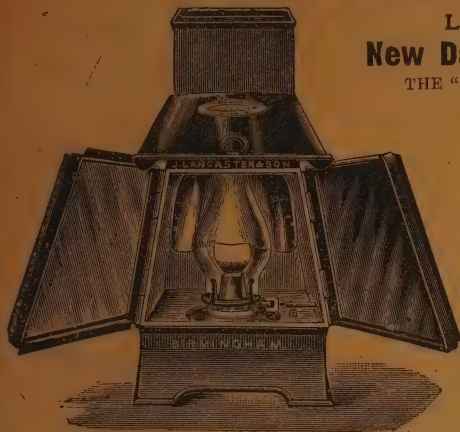


COLMORE ROW, BIRMINGHAM.

J. LANCASTER & SON, OPTICIANS,

LANCASTER'S
New Dark-Room Lamp.

THE "RUBRALUX" PATENT.



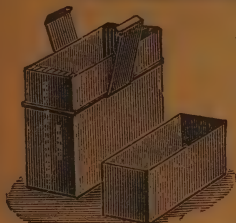
THIS Lamp is said to be the best ever invented for the Dark-Room. The Rubralux consists of a paraffin lamp giving a large amount of light, with a parabolic reflector reflecting the light forwards and downwards.

There are two folding glazed doors, one Ruby and one Canary Yellow. Each can be used separately or both together. The front is hinged and lined with silvered reflector, which floods the plate with ruby light, and prevents any light reaching the eye of operator excepting that reflected from plate.

Price 7/6.

Larger Lamp, 10/6.

Ditto for Gas, 12/6.

LIGHT-TIGHT
PLATE BOXES.

Made of Metal, blackened, to hold 1 dozen quarter-plates	1/-
Ditto, 1 dozen half-plates	1/6
" 1 " whole-plates	2/6
" 1 " 10x8	4/6
" 1 " 12x10	6/-

EBONITE TWEEZERS, 3d. per pair.

GLASS MEASURES, common, 4d. and 6d. each.

GLASS MEASURES, best, 1 oz. 9d.; 2 oz. 1/-; 4 oz. 1/3;
6 oz. 1/6; 8 oz. 1/9; 20 oz. 2/6.

BOXES OF SCALES AND WEIGHTS, with Brass

Pans, 3/- Ditto, with Glass Pans, 4/-

GLASS FUNNELS, 4d., 6d., 9d., and 1/-

CUTTING SHAPES Carte, 6d.; Cabinet 1/-

OVAL 9d.; 1/6;

FOCUSSING CLOTH, 1/6. VELVET ditto, 3/- and 4/-

LARGE
PARABOLOID
LAMP.

Full-Plate, 2/-; 10x8, 3/-

2/6; " 3/6.

This is an excellent Lamp for a large room; it gives a large amount of light, and has sliding frames containing coloured screens. It is made with Oil Burner, and also with Solar Gas Burner.

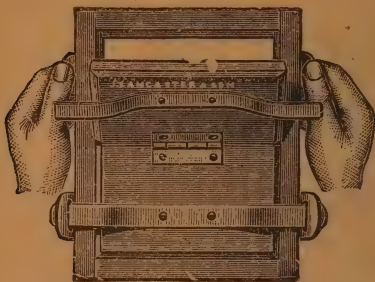
Oil Paraboloid Lamp, complete, 10/6; Gas Paraboloid Lamp, complete, 17/6.

COLMORE ROW, BIRMINGHAM.

J. LANCASTER & SON, OPTICIANS,

PRINTING FRAMES.

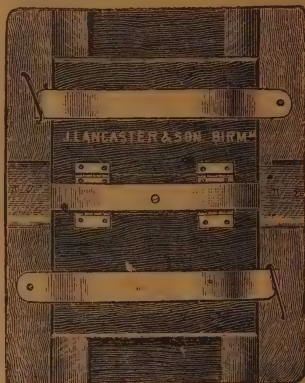
	$\frac{1}{4}$	$\frac{1}{2}$	$1\frac{1}{2}$	10x8	12x10	15x12 $\frac{1}{2}$
Cheap Printing Frames	6d.	1/0	1/6	2/0	3/0	4/0
Best Quality... ..	9d.	1/6	2/3	3/0	4/3	5/3



New Printing Frames.

WITH SIDE CLIP ARRANGEMENT.

$\frac{1}{4}$ -plate... ..	9d.	$\frac{1}{4}$ -plate... ..	1/6
$\frac{1}{2}$ "	2/3.	10x8 "	3/0



. . LANCASTER'S . .

New Mahogany Triple Pressure Printing Frames,

enabling both ends of Print to be examined at same time without the least fear of moving print.

$\frac{1}{4}$, 1/6; $\frac{1}{2}$, 2/3; Stereo, 2/3; $\frac{3}{4}$, 3/6; 10x8, 4/0; 12x10, 6/0; 15x12, 7/6 each. This is a perfect Printing Frame; no unequal pressure and no breaking of negatives. The Frames are well made and durable.

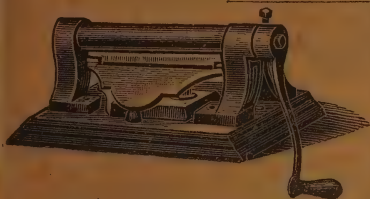
PLATE BOXES, &c.

	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{3}{4}$	10x8	12x10	15x12
White Wood Plate Boxes to hold 12 ...	1/0	1/9	2/6	4/0	5/0	7/0
Ditto ditto ditto 25 ...	1/6	2/3	3/6	5/6	7/0	9/6
Ditto ditto ditto 50 ...	2/0	3/0	4/0	6/6	8/0	10/6
Draining Racks, 12	1/3	1/6	2/0			
Ditto ditto 25	1/6	2/0	2/6			
Mahogany Plate Boxes, with Lock and Key, to hold 12 Plates	3/0	4/0	6/0	8/6	10/6	12/6
Vignette Glasses	9d.	1/6	2/3	3/0	4/6	

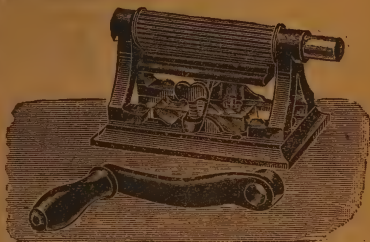
CARDS—Carte Size, 1/0, 1/3, 1/6, 1/8, 2/0, 3/0, and 4/0 per 100.
Ditto Cabinet Size, 6d., 8d., 1/0, and 1/6 per dozen.

COLMORE ROW, BIRMINGHAM.

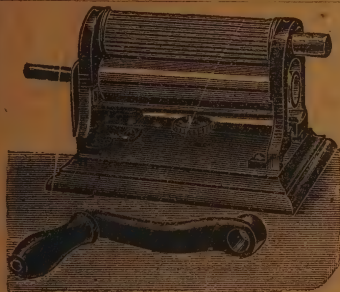
J. LANCASTER & SON, OPTICIANS,

**THE AMATEUR'S BURNISHER.**

Strongly made, with Polished Burnisher and
Lamp— $\frac{1}{4}$ -plate, 5/6; $\frac{1}{2}$ -pl., 8/6; $\frac{3}{4}$, 13/6;
12×10, 18/6.

**SUPERIOR BURNISHER.**

Quarter-plate, 10/6; $\frac{1}{2}$, 15/-; $\frac{3}{4}$, 18/6; 10×8, 21/-;
12×10, 27/6; 16×12, 31/6.

**THE TWIN ROLLER BURNISHER.**

A PERFECT BURNISHER.

With 6 $\frac{1}{2}$ -in. Rollers	30/-
" 9-in. "	42/-
" 11-in. "	63/-

Best Quality—

With 6 $\frac{1}{2}$ -in. Rollers	60/-
" 9-in. "	75/-
" 11-in. "	95/-

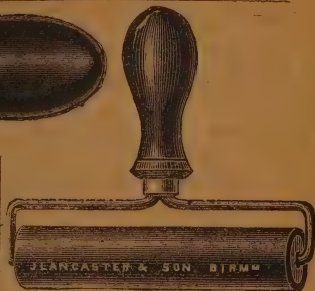


PRINT TRIMMERS, 1/- and 1/6.



**LANCASTER'S RIGHT-ANGLED
CAMERA LEVELS.**

1/9 each.

**RUBBER SQUEEGEES.**

-/9, 1/-, and 1/6.



LANCASTER'S CAMERA LEVELS, 1/- each.

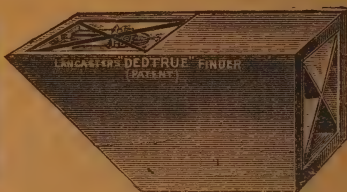
COLMORE ROW, BIRMINGHAM.

J. LANCASTER & SON, OPTICIANS,

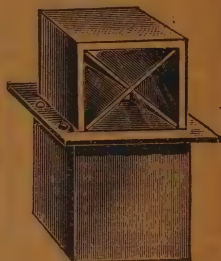
Lancaster's New Finders.



No. 2.



No. 4.



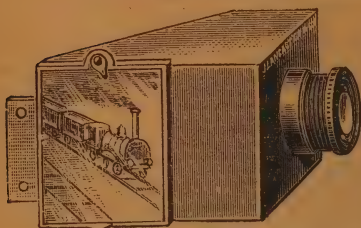
No. 3.

LANCASTER'S New Patent "Dedtru" Finder.—With this Finder it is impossible to see the image unless it is exactly in the centre or dead true. It is made in four sizes, and also with a Reflector for use on Base Board of Camera.

No. 1.—"Dedtru" Brilliant Finder, 2/- No. 2.—Ditto, larger, 3/-

No. 3.—Ditto, ditto, in box, with spring Jacket shutting down when not in use, 3/6

Ditto, ditto, larger size, 5/- No. 4.—Reflecting "Dedtru" Finder, 3/6



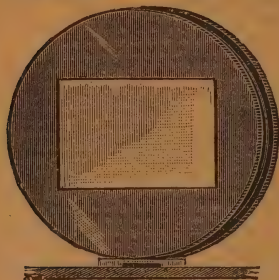
This is an excellent Finder, which can be attached in a second to the side or top of the Camera, giving an exact image, and covering same field as Lens in Camera.

Price 3/6

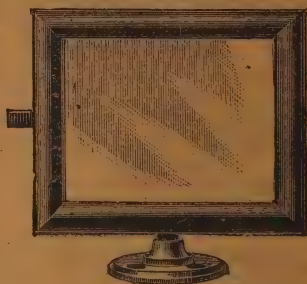
BEAUTIFULLY FINISHED.

With two Brackets, one to screw on side and the other on top of Camera.

TO FIX ON CAMERA.



Rotating Finder, 1/6

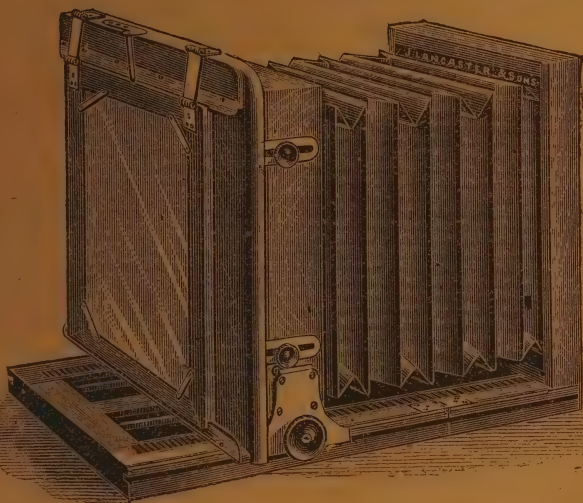


Rectangular Finder, 1/9

COLMORE ROW, BIRMINGHAM

J. LANCASTER & SON, OPTICIANS,

New Studio Camera.



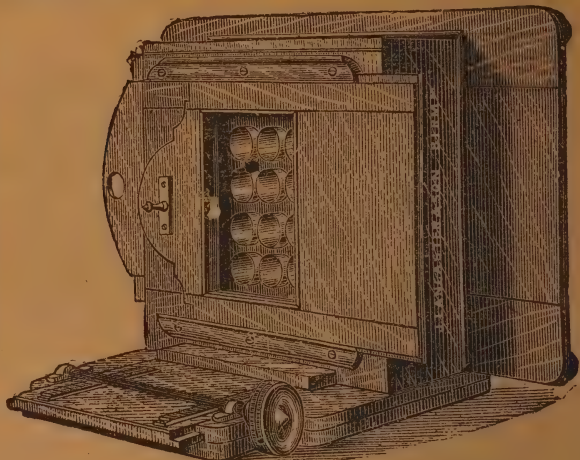
- 398 UNIVERSAL CAMERA, $\frac{1}{2}$ -plate, with Repeating Back, Rack Adjustment, Double Swing, Bellows Body, taking Cabinet, Portrait, or Group, and one or two Cartes on a plate £2 5 0
Extra Slides, 12/6 each.
- 398b BRASS BOUND STUDIO CAMERA of best quality and finish, Leather Bellows 3 5 0
Extra Slides, 17/6 each.
- 399 UNIVERSAL CAMERA, $\frac{1}{2}$ -plate, ditto, ditto, taking two Cabinets on one plate, two Cartes on one plate, or one Cabinet or one Carte 3 10 0
Extra Slides, 18/- each.
- 399b BRASS BOUND ditto, ditto 4 12 6
Extra Slides, 24/- each.
- 400 UNIVERSAL CAMERA, 10x8, ditto, ditto, to take Promenade, Malvern, Cabinet, and Carte size 6 5 0
Extra Slides, 24/- each.
- 400b BRASS BOUND ditto, ditto 7 10 0
Extra Slides, 35/- each.
- 401 UNIVERSAL CAMERA, 12x10, with Carriers for all sizes down to $\frac{1}{4}$, and every convenience for large studio work 9 9 0
- 401b BRASS BOUND ditto, ditto 11 0 0
Extra Fronts, 398, 2/6 .. 399, 3/- .. 400, 3/6 .. 401, 4/-
Double Dry Slides, 398, 15/- .. 399, 21/- .. 400, 30/- .. 401, 42/- each.

COLMORE ROW, BIRMINGHAM.

J. LANCASTER & SON, OPTICIANS,

Postage Stamp & Victoria Apparatus.

Stamp Cameras, with any number of Lenses,
made to order in a few days.



Midgest Cameras, Combination Cameras, for Postage
Stamps, Midgets, &c., made to order.

Our Apparatus has been in the Market for years, and has received the highest approbation. We guarantee every Lens of the best quality.

403	Polished Mahogany Camera, with 4 superior double combination Achromatic Lenses, Repeating Back, taking 12 on $\frac{1}{4}$ -plate ..	£2 10 0
404	Ditto, ditto, with six Lenses, to take 12 on $\frac{1}{4}$ -plate in two positions, with Rackwork Adjustment ..	3 0 0
405	Superior ditto, with 9 Lenses, to take 9 on $\frac{1}{4}$ -plate, or 18 on $5 \times \frac{3}{4}$ -plate, with Rackwork Adjustment ..	4 0 0
406	Superior Mahogany Camera, with 12 selected Lenses, Rackwork Adjustment, Instantaneous Shutter, will take 9 on $\frac{1}{4}$ -plate, 12 on $\frac{1}{4}$ -plate, 24 on 5×4 , and 36 on 7×5 plate, &c. ..	6 6 0
407	Polished Mahogany Camera, with 2 large Achromatic Double Combination Lenses, to take 4 Victorias in two positions on $\frac{1}{4}$ -plate ..	2 10 0
408	Superior Camera, with Rackwork Adjustment, Instantaneous Shutter, 4 best Lenses, to take 4 Victorias on $\frac{1}{4}$ -plate ..	3 10 0
409	Excellent Camera, with Rackwork Adjustment, Repeating Back, and set of Victoria Lenses, to take either 4 Victorias at once on $\frac{1}{4}$ -plate, or 8 on 7×5 -plate in two positions ..	5 5 0
483	Combined Gem and Victoria Camera, best quality, with 9 selected Victoria Lenses, extra Dark Slide, Rackwork Adjustment, and all latest improvements, taking 4 Victorias on a $\frac{1}{4}$ -plate, 9 Victorias on 7×5 , or 36 Gems on 7×5 in four positions ..	8 8 0

Postage Stamp or Gem Lenses.

FINEST QUALITY, 6/- per Lens, in sets of 4, 6, 9, and 12 on plate.
SECOND QUALITY, 5/- per Lens, in sets of any number.

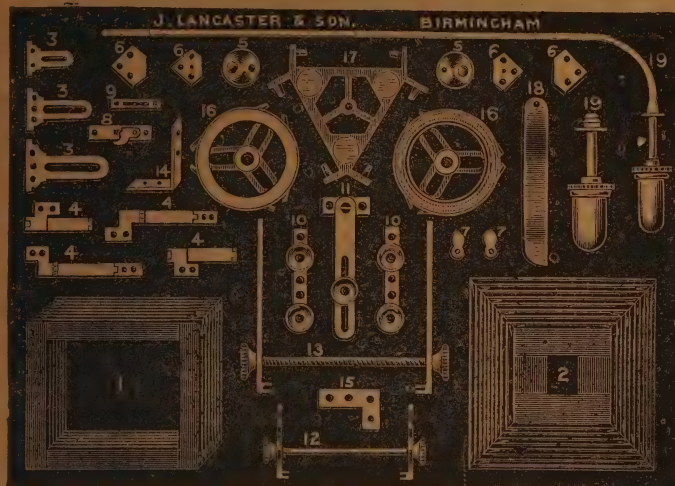
Victoria Lenses.

FINEST QUALITY, 9/- per Lens, in sets of 2, 4, 6 or 9 on plate. SECOND QUALITY, ditto, 7/- each.

COLMORE ROW, BIRMINGHAM.

J. LANCASTER & SON, OPTICIANS,

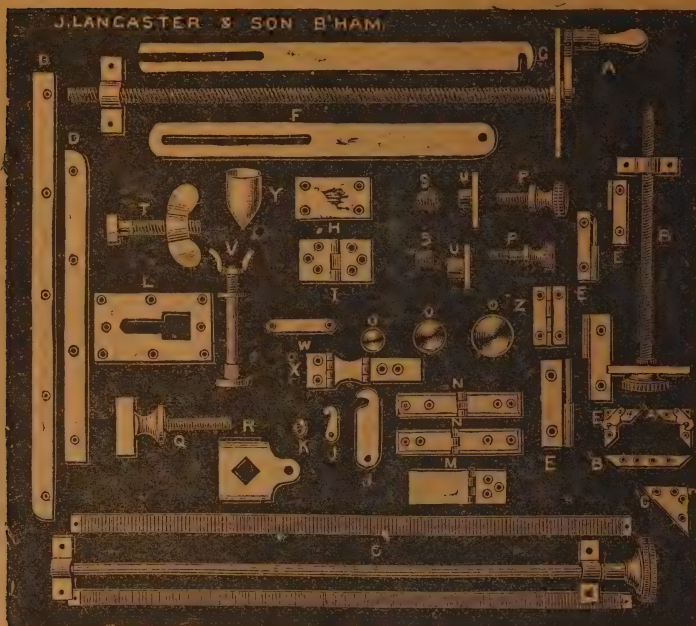
SUNDRIES.



		1	2	3	10×8	12×10	15×12
1.—Cloth Bellows, ordinary length	..	1/6	3/8	4/6	6/-	9/-	12/-
" " " square	..	2/-	3/9	5/6	7/6	10/-	13/-
" " " Kinnear	..	2/6	5/-	7/6	10/-	15/-	18/6
2.—Leather Bellows	..	2/6	4/6	6/6	8/6	12/6	15/-
" " " square	..	3/-	6/-	8/6	10/6	15/-	20/-
" " " Kinnear	..	4/-	8/-	12/6	15/-	21/-	30/-
3.—Swing-back Plates	.. each	-2	-2	-3	-3	-4	-4
4.—Patent Focussing Hinges	.. set of 4	1/-	1/-	1/-	1/-	1/-	1/-
5.—Circular Catches for Reversing Backs, pair	..	-3	-6	-6	—	—	—
6.—Circular Catch Angle Plates	.. per pair	-2	-2	-2	—	—	—
7.—Focussing Screens Bent Catches	.. each	-2	-2	-2	-2	-2	-2
8.—Cheese Cutters	..	-5	-6	-6	-6	-6	-6
9.—Slotted Plates for ditto	..	-1	-1	-1	-1	-1	-1
10.—Plates and Screws for Slides of Camera Fronts	..	-3	1/-	1/3	1/3	1/3	2/-
11.—Slide Stays and Fittings for Instantograph	.. each	1/3	1/6	2/-	2/6	3/-	3/-
12.—"Merveilleux" Front Stages	..	1/6	2/-	2/6	3/-	3/6	4/6
13.—"Instantograph" ditto	..	2/6	3/-	4/-	4/6	5/-	5/6
14.—Brass Corners	..	-2	-2	-3	-3	-4	-4
15.—Brass Plates for Slides	..	-2	-2	-3	-3	-4	-6
16.—Brass Circular Tops for Stands	..	1/6	2/-	2/6	3/-	3/6	4/-
17.—Triangle ditto	..	2/6	3/-	4/-	5/-	6/-	7/-
18.—Springs for Printing Frames	.. per pair	-3	-4	-6	-8	-10	1/-
19.—Patent Pumps for Shutters	..	1/6	1/6	1/6	1/6	2/-	2/-

COLMORE ROW, BIRMINGHAM.

J. LANCASTER & SON, OPTICIANS,
SUNDRIES.



		$\frac{1}{4}$	$\frac{1}{2}$	$\frac{3}{4}$	$10 \times 812 \times 1015 \times 12$
A.	Strong Screw for Cameras, each	2/6	4/-	6/6	8/6 10/6 12/6
B.	Lighter " " " " " "	2/-	3/6	5/6	7/6 8/6 10/6
C.	Racks and Pinion " " " " " "	3/-	5/-	7/6	10/6 12/6 15/-
D.	Brass Strips for Camera Backs, pair	-/6	-/9	1/-	1/3 1/6 2/-
E.	Pull-off Hinges " " " " " "	-/2	-/2	-/3	-/3 -/3 -/3
F.	Side Stays with Screws each	1/3	1/6	2/-	2/6 3/- 3/6
G.	" " for Instantograph " "	1/-	1/6	2/-	2/6 3/- 3/6
H.	Plates for Stands " " " " " "	-/1	-/1	-/2	-/2 -/2 -/2
I.	Hinges for Tail Board per pair	-/2	-/3	-/4	-/4 -/6 -/6
J.	Hooks for Slides " " " " " "	-/1	-/1	-/1	-/1 -/1 -/1
J.	" " Stands " " " " " "	-/2	-/2	-/3	-/3 -/4 -/4

COLMORE ROW, BIRMINGHAM.

J. LANCASTER & SON, OPTICIANS,

SUNDRIES—Continued.

	1	1	1	10×8	12×10	15×12
K. Turn Buttons for Slides per pair	-1	-1	-1	-1	-1	-1
L. Plates for bottom of Cameras „	-6	-3	1/-	1/-	1/6	1/6
M. Clip Hinges for Dark Slides „	-2	-2	-3	-3	-4	-4
N. Hinges for Focussing Glass „	-2	-2	-3	-3	-4	-4
O. Rising Front Screws ... each	-4	-5	-3	-8	-8	-8
P. Screws for bottom of Camera „	-4	-6	-6	-6	-9	-9
Q. T Screws for Stand: „	-6	-8	-8	1/-	1/-	1/-
R. Ears for Stands per set of six	-4½	-6	-9	1/-	1/-	1/4
S. Bushes for Screws ... per pair	-1	-1	-1	-2	-2	-2
T. Screw and Butterfly for Stands ...	-6	-9	1/-	1/3	1/6	1/6
U. T Bushes for Cameras ... each	-1	-2	-2	-3	-3	-3
V. Screws for Stands, set of 3 ...	1/-	1/3	1/6	1/6	1/9	2/-
W. Straps for Focussing Frame, set of 4	-2	-3	-4	-4	-4	-4
X. Double Hinges for Focussing Frame	-3	-3	-4	-4	-6	-6
Y. Toe Caps, all in one piece (3) ...	-3	-4	-4	-6	-6	-9
Z. Hinges for Dark Slides, &c., per pr.	-2	-3	-4	-4	-6	-6
A' Corner Plates for Reversing Back, &c., per pair	-3	-4	-4	-6	-6	-6
B' Corner Plates for Slides, &c. „	-2	-2	-3	-3	-4	-4
C' Angle Plates for Reversing Back, &c., per pair	-2	-2	-3	-3	-4	-4
Complete set of Brass Work for 1903						
Le Merveilleux ...	5/6	7/6	10/6	12/6	15/-	
Ditto for 1903 Meritoire ...	7/6	10/6	12/6	15/-	18/-	
Ditto for 1903 Instantograph	10/6	15/-	21/-	25/-	30/-	
Fine Ground Focussing Glass ...	-6	1/-	1/6	2/-	2/6	3/-
Merveilleux Lens, unmounted ...	3/-	6/-	10/-	15/-	20/-	30/-
Instantograph ...	12/6	21/-	30/-	40/-	50/-	60/-
Leather Caps for Lenses ...	-6	-6	-8	-8	1/-	1/-
Black Cardboard for Slides per doz.	-6	-9	1/-	1/6	2/-	2/6
Flanges for Lenses ...	1/-	1/6	2/-	2/6	3/-	3/6
Extra Fronts ...	1/-	2/-	2/6	3/-	3/6	4/-

BELLOWS OF ANY SIZE MADE TO ORDER.

DARK SLIDES MADE TO ORDER.

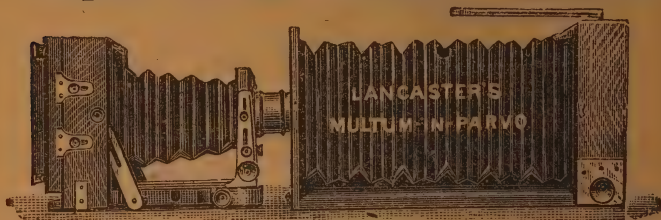
COLMORE ROW, BIRMINGHAM.

J. LANCASTER & SON, OPTICIANS,

Lancaster's Multum-in-Parvo Camera.

FOR ENLARGING AND REDUCING.

The Multum-in-Parvo Camera can be used with any ordinary Camera, and may be used for Enlarging, Copying same size, or Reducing. Also for Lantern Transparencies.

Capital Daylight Enlarging apparatus.

For Enlarging.—The Negative must be placed in a Dark Slide of ordinary Camera and the Enlargement taken in Multum-in-Parvo, the plate going into the end of Camera.

For Copying same size, the two Cameras must be opened out equally to about twice the length of focus of lens used.

For Reducing.—The Negative must be placed in Multum-in-Parvo Camera, and Plate put into Dark Slide of Ordinary Camera.

PRICES.

To enlarge up to $\frac{1}{4}$ -plate	£0 10 6	To enlarge up to 18×16	£3 0 0
" " $\frac{1}{2}$ " "	0 15 0	" " 20×18	3 15 0
" " $\frac{3}{4}$ " "	1 1 0	" " 24×20	4 4 0
" " 10×8	1 5 0	" " 30×24	5 5 0
" " 12×10	1 10 0	" " 36×30	8 8 0
" " 15×12	2 0 0		

Extra Slides : $\frac{1}{4}$, 5/- ; $\frac{1}{2}$, 7/6 ; $\frac{3}{4}$, 10/- ; 10×8, 13/6 ; 12×10, 16/- ; 15×12, 20/-

The Amount of Enlargement or Reduction can be varied as required.

Lancaster's Lantern Slide Multum in Parvo.

This is a well-made Camera, with Double Bellows, Mahogany Slide and Focussing Slide; excellent Lens with Shutter. The Camera can be used for Copying Prints, Photographs, &c., exactly as an ordinary Camera, and for making Lantern Slides it is used as represented in woodcut. Camera, Lens, Flap Shutter, &c., $\frac{1}{4}$ -plate, 21/-.

COLMORE ROW, BIRMINGHAM.

J. LANCASTER & SON, OPTICIANS,

LANCASTER'S Combination Multum in Parvo.



THIS is a well-made Camera with Double Bellows. The Camera and Lens may be used for ordinary work. The Lens is an Achromatic one, specially constructed for enlarging and reducing. Each set consists of Camera, Dark Slide, and Achromatic Lens.

1 Combination Multum in Parvo, 35/-

10 x 8, 42/- 12 x 10, 50/- 15 x 12, 63/- 18 x 16, 105/- 24 x 20, 126/-



The Dark Slide will hold either a Dry Plate or Bromide Paper, and Carriers can be had to carry any sized plate.

Extra Slides.

$\frac{1}{2}$	...	...	10/-
10 x 8	...	...	13/6
12 x 10	...	...	16/-
15 x 12	...	...	20/-
18 x 16	...	...	30/-
24 x 20	...	...	35/-

Carriers.

$\frac{1}{4}, \frac{1}{2}, \frac{1}{1}$	...	1/- each
10 x 8, 12 x 10	1/6	"
15 x 12	1/6	"
18 x 16	3/-	"
24 x 20	3/6	"

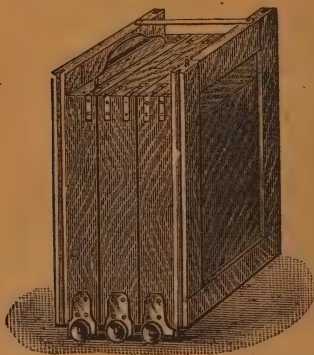
COLMORE ROW, BIRMINGHAM.

J, LANCASTER & SONS, OPTICIANS,

LANCASTER'S First Quality Combination Multum in Parvo.



BRASS-BOUND Mahogany Camera, with Double Bellows, Folding Tail Board, superior Achromatic Enlarging Lens, and Carriers down to $\frac{1}{4}$ -plate, making a complete Daylight Enlarging Apparatus.



$\frac{1}{4}$ -plate Brass-bound Mahogany				
"Multum in Parvo," with $\frac{1}{2}$				
and $\frac{1}{4}$ Carriers, Achromatic				
Lens, and Dark Slide	...	£3	10	0
10 by 8 ditto ditto	...	4	4	0
12 by 10 ditto ditto	...	5	5	0
15 by 12 ditto ditto	...	6	6	0
20 by 16 ditto ditto	...	10	10	0

COLMORE ROW, BIRMINGHAM.

J. LANCASTER & SON, OPTICIANS,

THE

"Lancaster" Enlarging Lantern

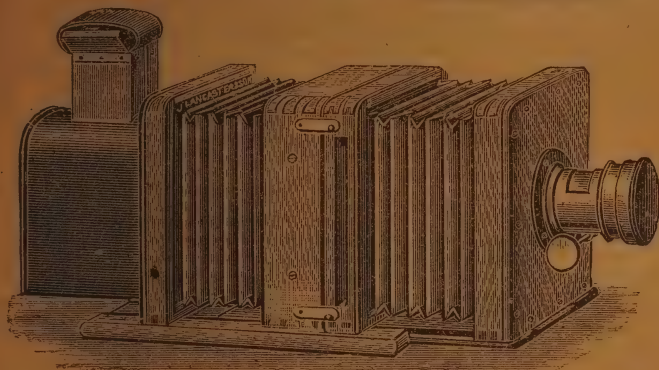
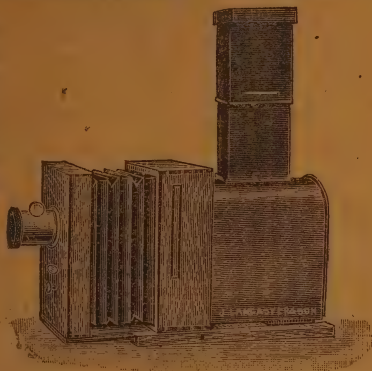
THIS Lantern has a pair of 5 in. best Condensers, mounted in Brass, Paraffin Lamp, giving a brilliant light, producing Enlargements crisp up to the edges, and a new formula Double Achromatic Objective, and Carrier for Negative.

427—With 5-in. Condensers,

£3 3 0

428—With 6-in. Condensers,

£4 4 0



The "Lancaster" Enlarging Lantern.

It is in all respects a fine Apparatus, everything being of the best possible workmanship and material.

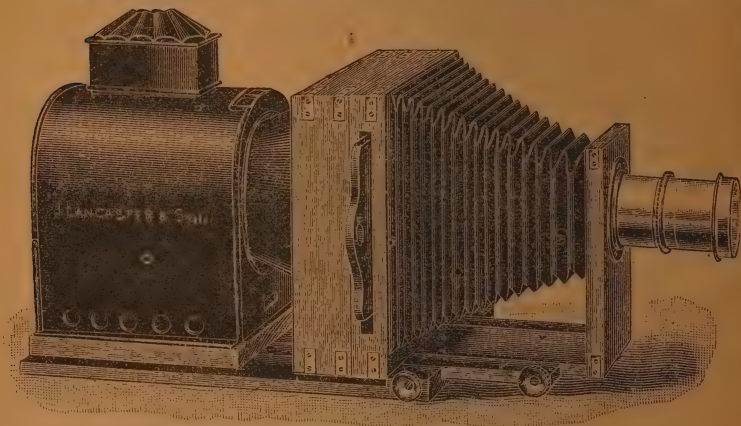
PRICES.

429	Enlarging Lantern, with 6 in. Condensers, &c.	...	...	...	£6 6 0
430	" " " 7 in. "	...	...	...	8 8 0
431	" " " 8 in. "	...	...	...	9 9 0
432	" " " 9 in. "	...	...	...	10 10 0
433	" " " 10 in. "	...	...	...	12 12 0
434	" " " 11 in. "	...	...	...	15 15 0
435	" " " 12 in. "	...	...	...	18 18 0

COLMORE ROW, BIRMINGHAM.

J. LANCASTER & SON, OPTICIANS,

LANCASTER'S
EUREKA ENLARGING LANTERN.



THE EUREKA ENLARGING LANTERN consists of a Lantern proper and Optical Combinations, mounted on rough and fine Rack adjustments.

The Lantern body carries either Electric, Lime, or Incandescent Burners, and either Alcolux, Acetylene, or Petroleum Lamps.

The Optical portion is mounted on a triple base, giving unlimited adjustments, a clamping quick adjustment for obtaining focus, and a fine Rackwork for perfect focussing.

The Condensers are best quality, and the Achromatic Fronts are of special construction for enlarging purposes, mounted in brass, with Iris Diaphragms.

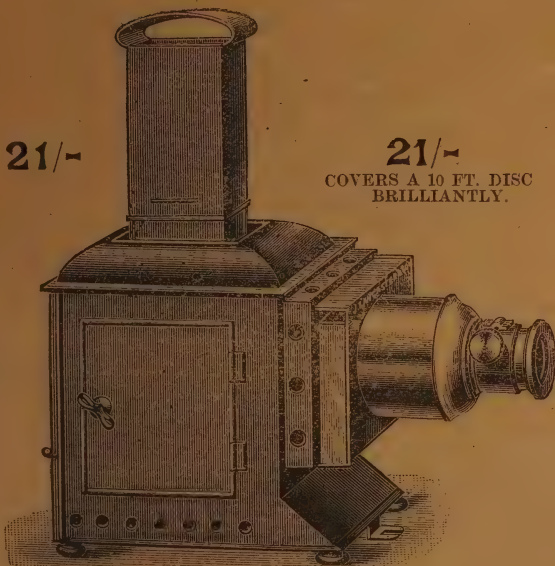
Eureka Enlarging Lantern, without Lamp--

With Condensers, 5in. 75/-; 6in. 115/-; 7in. 150/-; 8in. 180/-; 9in. 200/-
3-Wick Lamp ... „ 7/6; „ 10/-; „ 10/-; „ 12/6; „ 12/6

Alcolux Lamp, for any size ... 25/-

COLMORE ROW, BIRMINGHAM.

J. LANCASTER & SON, OPTICIANS,

LANCASTER'S NEW LANTERN.**For Lecture and Home Use.**

No. 438R.

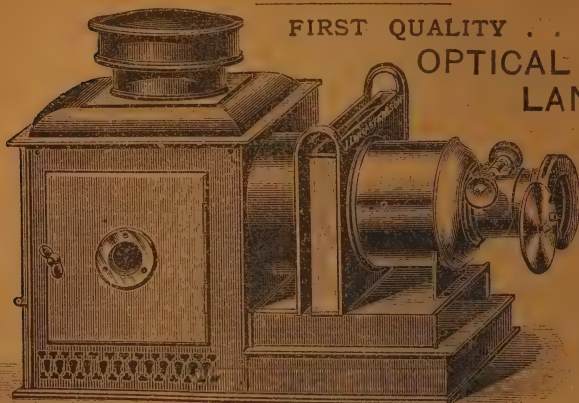
THIS Lantern contains 4-in. Condensers mounted in Brass Cells, Achromatic Front Rackwork Lenses in Brass Mount, Three-wick Lamp of good quality, and is in every way an excellent Lantern, giving a 10-ft. disc.

438...	£1 1 0
438R.—Superior ditto	1 5 0
438BR.—Lantern, with 4-in. Condensers, best Achromatic Front, and Four-wick Lamp	1 10 0
453 Ditto, with Brass Fronts, Rackwork Adjustment, 4-in. Condensers, and best Front Lenses	2 2 0
453a.—Ditto ditto with 5-in. Condensers	2 17 6

COLMORE ROW, BIRMINGHAM.

J. LANCASTER & SON, OPTICIANS,

FIRST QUALITY . .
OPTICAL
LANTERN.



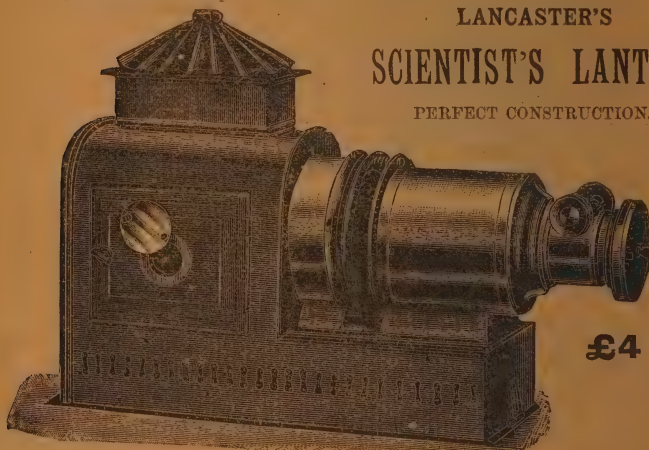
Made
of
Russian
Iron.

£3 3s.

This is a new Model, with strong body, open front for chemical and electrical experiments, finest quality optical front of new construction, front flasher and slot for coloured glasses, to give sunrise, sunset, and moonlight effects on plain photos; also best four-wick Lamp.

LANCASTER'S
SCIENTIST'S LANTERN.

PERFECT CONSTRUCTION.



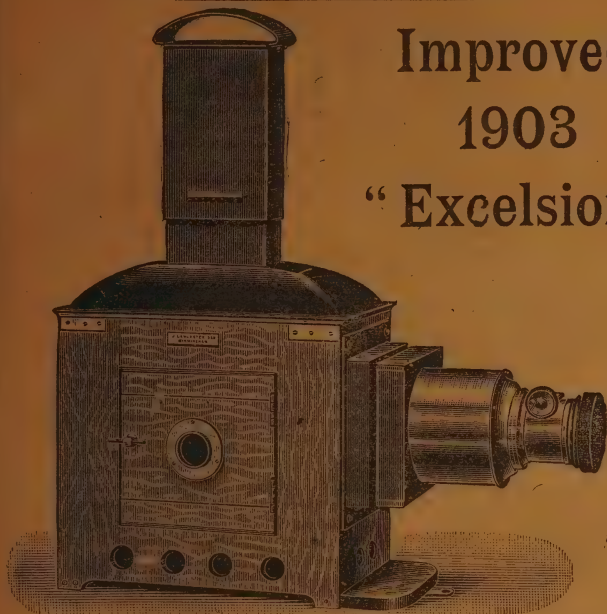
£4 4s.

Fitted with best Condensers and finest quality achromatic objective, new four-wick Lamp, with every recent improvement, solid brass front in sections, so that the centre part can be removed for physical experiments. The body of the Lantern is made of best quality Russian Iron.

COLMORE ROW, BIRMINGHAM.

J. LANCASTER & SON, OPTICIANS,

Improved 1903 "Excelsior."



No. 469. FINEST LANTERN MADE. £3 3 0

THE NEW MODEL "EXCELSIOR" is made of Mahogany, Brass Bound, and has 4-in. best Condensers, mounted in Brass, with Ventilation Apertures to prevent Condensing Lens steaming during exhibition, Special Achromatic Front, with large Back Combination, giving brilliant definition and covering well a twelve-foot disc, with crispness from centre to margin.

Our New Four Wick Lamp, with the light concentrated into the smallest possible space, giving brilliant illumination; new system of ventilation, in which air currents enter between the wicks—producing maximum light from hydro-carbons burnt.

The whole packed in Polished Wood Case, with Handle, Lock and Key .. £3 3 0

Our New Dissolver, giving the most perfect dissolving effects possible with a Single Lantern. 0 5 0

New Dissolving Slide, to use with above 0 3 6

Achromatic Microscope, adaptable to any Lantern, with double combination power, &c. 1 1 0

Ditto ditto ditto ditto three powers 2 2 0

Jet Tray for Limelight 0 2 0

Set of Apparatus for Limelight to fit "Excelsior" .. £3 3 0 and 5 5 0

No. 469 B.

IMPROVED "EXCELSIOR." This is a new Lantern on the model of "Excelsior," but with considerable improvements. The whole of the Front Stages are of strong well-finished brass. The Lamp is one of our latest productions, and the Front Combination is our new Objective, giving different-sized pictures at one distance, with perfect definition.

Price complete, in Polished Box, with Lock and Key, 84/-.

This Lantern is the most compact and perfect ever introduced.

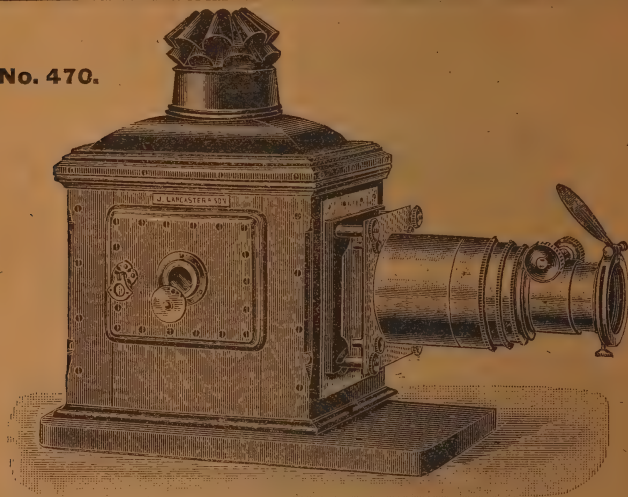
COLMORE ROW, BIRMINGHAM.

J. LANCASTER & SON, OPTICIANS,

... FIRST QUALITY ...

Optical Lantern.

No. 470.



A FIRST QUALITY LANTERN throughout, with all latest improvements. Suitable for any sized Hall. Built in best Mahogany, and metal lined, and mounted on Solid Mahogany base. Fitted with Solid Brass Triple Expansion Front, Finest quality 4 in. Condensers, and two Double Combination Achromatic Front Lenses of $2\frac{3}{4}$ in. diameter, of best construction of either 6, 8, 10 or 12 inch focus, in Sliding Tube and Rack Mount for fine adjustment, with Flasher, Tinter, &c.

The whole in Polished Case, with Lock and Key ... £6 6 0

Extra Double Combination Achromatic Front Lenses, 6, 8,
10 or 12 inch focus ... each 1 1 0

Set of Lime-light Fittings, including Best Blow-through
Jet, Oxygen Cylinder, with Regulator, India-Rubber
Tubing, &c. ... extra 3 10 0

The **ALCOLUX Incandescent Lamp** of 100 Candle Power
(for particulars see page 547) fitted to above ... extra 1 5 0

COLMORE ROW, BIRMINGHAM.

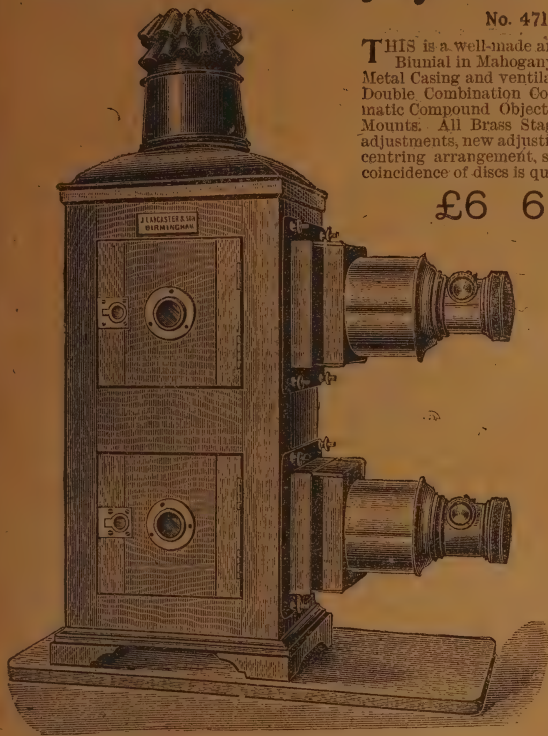
J. LANCASTER & SON, OPTICIANS,

BIUNIAL LANTERN.

No. 471.

THIS is a well-made and strongly-built Biunial in Mahogany, well lined with Metal Casing and ventilated. Best 4-inch Double Combination Condensers, Achromatic Compound Object Lenses, in Rack Mounts. All Brass Stages, with sliding adjustments, new adjusting and changing centring arrangement, so that a perfect coincidence of discs is quickly obtained.

£6 6 0



COMPLETE, 126s.

Pair Blow-through Jets, Cog-wheel Lime Adjustment, Gas Bag, Board, Retort, Purifier, Dissolver, &c. ...	£4 4 0
Ditto Oxy-Hydrogen High Pressure Jets, with 10-ft. Oxygen Cylinder, Regulator, Dissolver, Tubing, &c. ...	6 6 0
Strong Polished Cabinet, with drawer, &c., to carry Biunial, &c. ...	1 1 0

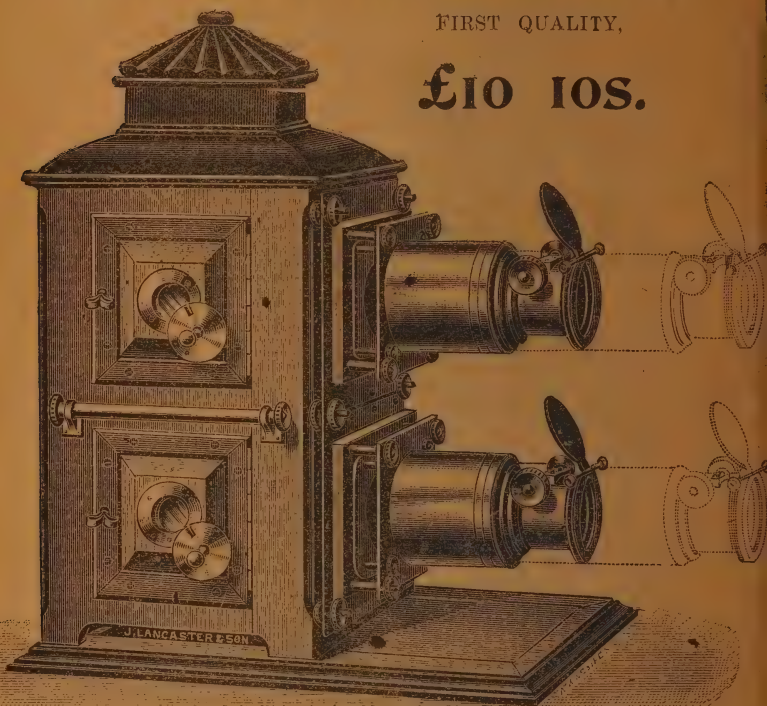
COLMORE ROW, BIRMINGHAM.

J. LANCASTER & SON, OPTICIANS,

LANCASTER'S
New Biunial Lantern

FIRST QUALITY,

£10 10s.



A First Quality Lantern with best Condensers, all brass Triple Expansion Fronts with fine Rack Adjustment and superior Achromatic Objectives, $2\frac{3}{8}$ inches diameter, giving superb definition all over the disc.

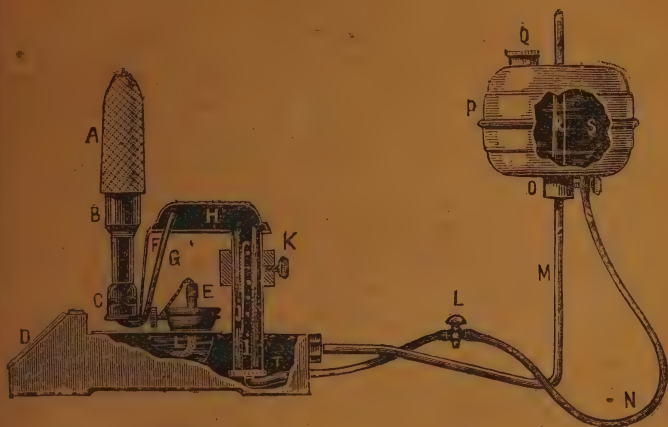
Complete in Case £10 10s.

High Pressure Jets, with 10 feet Oxygen Cylinder, Regulator,
Dissolver, Tubing, &c., extra £6 6 0

COLMORE ROW, BIRMINGHAM.

J. LANCASTER & SON, OPTICIANS,

THE ALCOLUX INCANDESCENT LAMP



100 CANDLE POWER.

THE ALCOLUX INCANDESCENT LAMP is a new form of Incandescent Lamp of high illuminating power. It consists of an Incandescent Burner (B C), with Mantle (A), Reservoir (P) carrying supply of Alcohol or Spirits of Wine, which can be moved up and down a carrying Rod (M), thus giving any required flow of Spirit, and a Volatilising Chamber (H), heated by Spirit Lamp (E). The Spirit descends from P, passes through a cotton wick (I), and falls, drop by drop, into H, and is there volatilised and blown at high pressure through the Burner (B), and when lit produces a brilliant light without the slightest danger.

Price of Lamp, complete ... 25/-.

The Alcolux can be fitted to any ordinary Lantern. It is a wonderful improvement on Petroleum Lamps.

COLMORE ROW, BIRMINGHAM.

J. LANCASTER & SON, OPTICIANS,

**A****B**

Apparatus for Lime-Light.

SEAMLESS STEEL CYLINDERS.

BEST QUALITY GUARANTEED.

Capacity. Cubic feet.	Length. Inches.	Width. Inches.	Weight. lbs.	PRICE
10	20	4	14	£1 15 0
15	27	4	20	2 1 0
20	21	5½	35	5 0
30	28	5½	42	3 0
40	35	5½	48	3 10

Valve Key in Wood Handle	...	...	...	2/-
Patent Folding Sheet Handle, A	...	...	...	2/6
Nipple and Union, as in A	...	...	...	2/3
Fine Tap Regulators, as in B	...	...	...	7/6

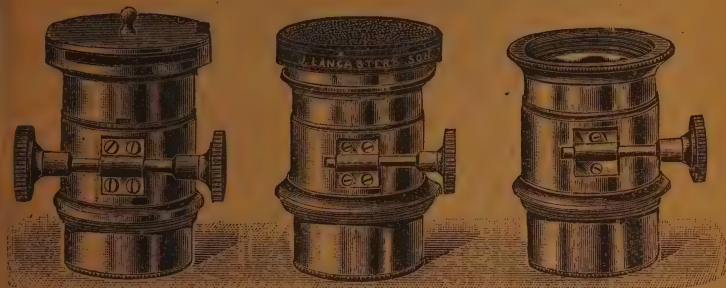
The Tap Regulator gives an easy control in the flow of gas from Cylinders, and is extremely simple and cannot get out of order. It can only be used for a Single Lantern.

The Wrought-iron Stand in **A** and **B** is very useful for holding Cylinders when in action ... 5/- each.

In using Cylinders it is essential to use one for each gas; if the same cylinder is used for Oxygen and Coal Gas serious accidents may happen.

COLMORE ROW, BIRMINGHAM.

J. LANCASTER & SON, OPTICIANS,

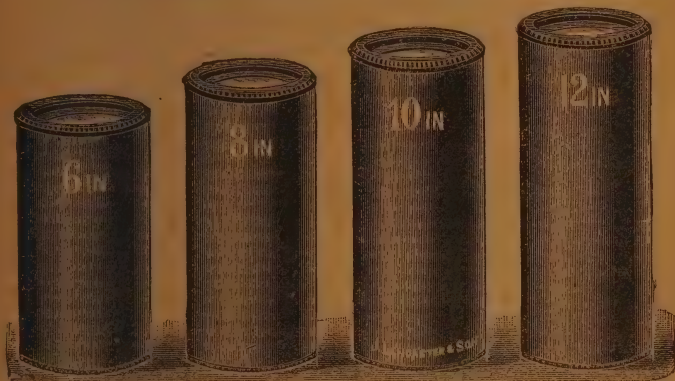


447

446

445

- | | | |
|-----|---|---------|
| 444 | Achromatic Double Combination Sliding Fronts | £0 10 6 |
| 445 | Achromatic Double Combination Fronts in Rackwork | 0 12 6 |
| 446 | Superior ditto ditto | 0 15 0 |
| 447 | First Quality Achromatic Objective, with Flasher and Space
for Coloured Discs | 0 17 6 |
| 448 | TRIPLE COMBINATION Achromatic Front, giving a 20-ft. or
any other size disc at seven different distances, in Rackwork,
with Lengthening Tubes | 2 10 0 |



LANCASTER'S COMBINATION OBJECTIVE.

With Jacket, Flasher, space for Tinting Glasses, and
two series selected by purchaser, 6-in., 8 in., 10-in.,
or 12-in. focus, with 2-in. diameter Back Lenses ... £1 1 0
Extra Combinations ... each 0 5 6

COLMORE ROW, BIRMINGHAM.

J. LANCASTER & SON, OPTICIANS.

Lancaster's New Portable
Lantern Screen
and Stand.

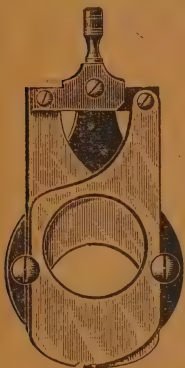
499

Can be erected or taken down in a few minutes, the whole packing into the smallest possible space.

7-ft. Stand and Screen, complete, with box for sheet .. £1 5 0

9-ft. ditto, ditto .. 2 5 0

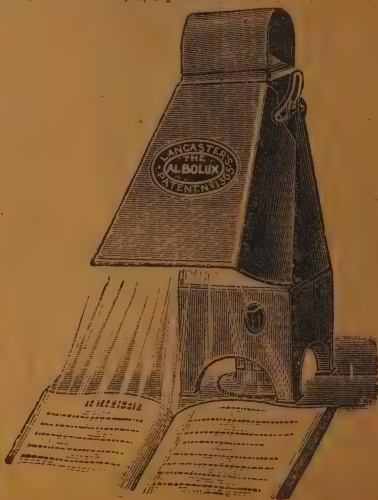
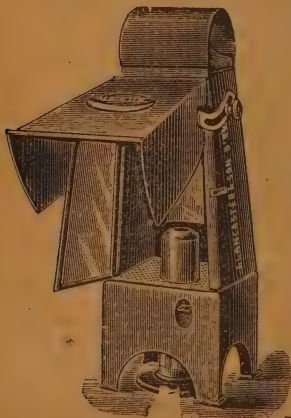
Larger sizes to order.



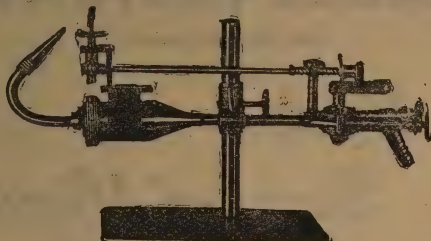
LANCASTER'S DISSOLVING SLIDE.—To use with their Lantern Dissolver, Mahogany and Brass Runners, price 3/6.

LANCASTER'S DISSOLVER.—To use with a Single Lantern, giving, with Dissolving Slide, a most perfect dissolving Effect, price, 5/-

LANCASTER'S NEW READING LAMP.—The 'ALBOLUX' PATENT.—This lamp carries a candle which burns for over two hours. It has Parabolic Reflector, ground-glass Screen and Shield Reflector, giving a beautifully soft light on the manuscript. 'Albolux,' No. 1, price 5/-; 'Albolux,' No. 2, larger size, with bell, &c., price 7/6. For No. 1, Candles, 1/- per dozen; for No. 2 Candles, 2/6 per dozen.



THE NEW
GWYERS SPECIAL
 CINEMATOGRAPH
LIME-LIGHT JETS.



To suit all buyers the GWYER JETS are made from 35/- to 68/-. Even the cheapest Gwyer Jet will give more light than any other make of jet. Free trial allowed.

That nearly every lanternist of experience is now using the Gwyer Jet is a proof of its superiority.

THE PENDANT SATURATOR

Why is it the Saturator the most approved by lanternists?

Because it is in advance of all others in the following points:—

It is absolutely impossible to ignite the interior.

It is impossible to blow liquid into the jet or tubes.

The old waste liquid can be pumped out from the Saturator, consequently it never fails.

It will work at the highest pressure with the same certainty as at low.

Its simplicity enables any one to work it, as mismanagement cannot produce an accident.

Catalogue on application giving useful hints on the management of the oxyhydrogen light.



MANUFACTURERS—

J. S. WILLWAY & SONS, St. Augustine's, Bristol.

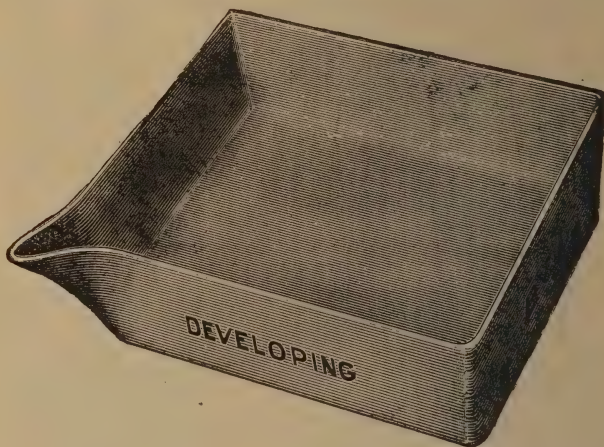
The NEW PORCELAIN PHOTO TRAYS

All Sizes.

Deep and Shallow.

Send for sample Quarter-plate.

Post Free, ONE SHILLING.



BURGESS & LEIGH, Middleport Pottery, BURSLEM,
And at 44, FARRINGDON ST., LONDON, E.C.

THE BRITISH JOURNAL PHOTOGRAPHIC ALMANAC

AND

Photographer's Daily Companion

FOR

1903.

Edited by THOMAS BEDDING, F.R.P.S.

ADVERTISERS' INDEX, see pp. 1255-1258.

POSTAL AND TELEGRAPHIC ADDRESSES, see pp. 1263-1272.

CONTENTS, see pp. 1191-1198.

LONDON :

HENRY GREENWOOD & CO., PUBLISHERS, 24 WELLINGTON ST. STRAND.

PARIS: BOYVEAU & CHEVILLET, 22 RUE DE LA BANQUE.

NEW YORK: G. GENNERT, 24 to 26 EAST THIRTEENTH STREET.

MELBOURNE: BAKER & ROUSE, LTD.; J. W. SMALL & CO.; WATSON & SONS.

SYDNEY: BAKER & ROUSE, LTD.; J. W. SMALL & CO.; AND
HARRINGTON & CO., LTD.

ADELAIDE AND BRISBANE: BAKER & ROUSE, LTD.; HARRINGTON & CO., LTD.

HOBART: P. ASH.

CAPE COLONY, NATAL, RHODESIA, TRANSVAAL, AND ORANGE RIVER
COLONY: LENNON, LTD.

VALPARAISO: BAILEY, DIENER & CO.

BOMBAY: BABAJEE, SAKHARAM, & CO.

PREFACE.

FOLLOWING the plan adopted in recent issues of the ALMANAC, I have endeavoured in the Epitome of Progress in the present volume to collect some of the most important theoretical and practical papers that have been published during the past year. Special mention should be accorded to the Traill Taylor Memorial Lecture of Professor S. P. Thompson and the lengthy Memoir of Dr. Luppó Cramer, as evidencing the most advanced work in the optics and chemistry of photography. To the miscellaneous pages many additions have been made, and the formulæ section has been revised and enlarged.

For the first time photo-micrography forms the subject of a leading article, and it will be observed that amongst the shorter contributions the same theme receives treatment from several pens. It is hoped that interest in this beautiful branch of work will be stimulated by the various references to it in the present volume.

"Recent Novelties in Apparatus"; a collection of practical notes and a number of short articles comprise the remaining features of the 1903 Almanac.

I thank all those who co-operated with me in the production of the volume, and wish its readers in all parts of the world a happy and prosperous New Year; and I again take the opportunity of adding that week by week, in the pages of THE BRITISH JOURNAL OF PHOTOGRAPHY, I am always happy, as far as possible, to advise or help in matters of doubt or difficulty connected with photographic work.

THOMAS BEDDING, Editor.

24, WELLINGTON STREET, STRAND, W.C.,

December, 1902.

INDEX TO ADVERTISERS, 1255-1258.

POSTAL AND TELEGRAPHIC ADDRESSES, 1263-1272.

CONTENTS, 1191-1198.

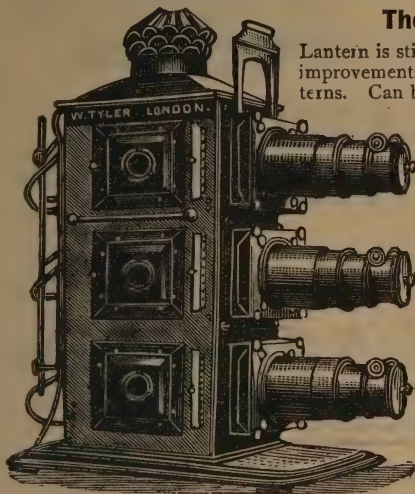
Optical Lanterns and Slides.

WALTER TYLER & CO.,

48 to 50, Waterloo Road, LONDON, S.E.

have the largest and best stock of Optical Lanterns, Apparatus and Slides in the world, which can be purchased, exchanged, or had on hire.

Over Half-a-million Slides always in stock.



The HELIOSCOPIC

Lantern is still unsurpassed, and has many improvements not possessed by other Lanterns. Can be used with any illuminant—oil, limelight, electric, or acetylene.

Latest production—

The KOH-I-NOOR

Acetylene Generator gives a marvellous Brilliant White Light, and can be used with any Lantern.

Lanterns, Slides, Cinematographs and Apparatus supplied on the Easy or Gradual Payment System, the Apparatus sold on these terms being an absolute sale, and not the usual hire purchase terms.

Second-hand Lanterns, Slides, and all kinds of Lantern Apparatus at Greatly Reduced Prices.

. . GENUINE BARGAINS . .

New Catalogue, upwards 700 pages, fully illustrated, post free, 12 stamps. Smaller Catalogue, 6 stamps. Second-hand List, post free.

. . SPECIAL NOTICE . .

If you desire to Purchase, Sell, Hire, or Exchange Lanterns, Slides or Apparatus, you cannot do better than go to

WALTER TYLER & CO.,

48 to 50, WATERLOO ROAD, LONDON, S.E.

EXPORT TRADE.



JOHN SPENCER

121, West George Street,
GLASGOW.



SHIPPER TO
FOREIGN & COLONIAL
DEALERS ONLY

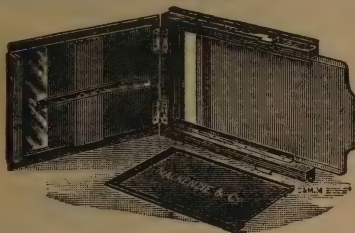
OF ALL KINDS OF

Photographic Materials and Supplies.

Long experience and knowledge of the Markets.
Correspondence invited from Responsible Firms.

MACKENZIE-WISHART PATENT DAYLIGHT SLIDES AND ENVELOPES

The many congratulations we have received unasked, testify to the great success of our system, and has far exceeded our most sanguine expectations. By those competent to judge, our slide is acknowledged to be the best and simplest means of exposing plates or cut films in the camera.



✦ PRICES ✦

	Slides.	Envelopes.
$\frac{1}{2}$ Plate	15/-	1/-
$5 \times \frac{1}{4}$ "	18/-	1/3
$\frac{1}{2}$ "	21/-	1/6
$\frac{1}{4}$ "	27/6	3/-

Can be fitted to almost any
Camera including Kodaks.



The undernoted are only a few of many testimonials received last season :—

Bream's Buildings, LONDON, E.C.
28th June, 1902.

I have found nothing so satisfactory and reliable as the Mackenzie-Wishart Daylight Slide and Envelopes. The idea is so obvious and simple that the wonder is that it has not been thought of before; but that is always the case with inventions of real practical merit.

Photo Editor, "QUEEN."
144, Cowley Road, OXFORD,
28th October, 1902.

I have much pleasure in stating that the Slide and Envelopes are a great success, and I am delighted with the apparatus and appreciate it the more after my unfortunate experience with the _____.

H. W. APPLETON.
Westbourne, DIDSBURY,
11th October, 1902.

I found them in many ways a great improvement on my double slides, and most convenient on tour, especially when cycling. My negatives were quite free from pin-holes.

FRANK P. BAYLEY.

Bank Field, Higher Broughton, MANCHESTER,
1st October, 1902.

I am delighted with the ease and comfort they bring to the art of photography, and they have in my hands worked perfectly. I shall recommend them wherever I get an opportunity.

THOMAS G. WATSON.
24, James Street, HARROGATE,
23rd October, 1902.

The Mackenzie-Wishart Slide has given great satisfaction to my customer.

J. H. MARLOW.
Hollybank, Partick, GLASGOW,
19th May, 1902.

I can testify to their thorough efficiency, being very easy to operate with, and the simple manner by which the plate is dusted by the drawing of the slide before exposure, is a great recommendation in their favour.

HUGH REID.

Early in the coming season we shall have ready a large stock of our Slides and Envelopes, but we would ask that orders be placed soon to prevent disappointment.

Sample Slide and Envelope sent on approval on receipt of three Stamps.
List with full particulars from Patentees and Sole Makers.

MACKENZIE & Co.,

Manufacturing Opticians and Camera Makers,

17, Douglas Street,
GLASGOW.

Telegrams: "DAYLIGHT," GLASGOW.

British Films for Britons, but not for Britons only.

The 

AUSTIN EDWARDS FILMS

Please Users Everywhere.

The Flat Films have been before the public for many years, and each year has seen largely increased sales. A well-known user says: "Your Films are the unbounded admiration of everybody who has seen them, besides being simplicity itself to work."

The Ensign Roll Films

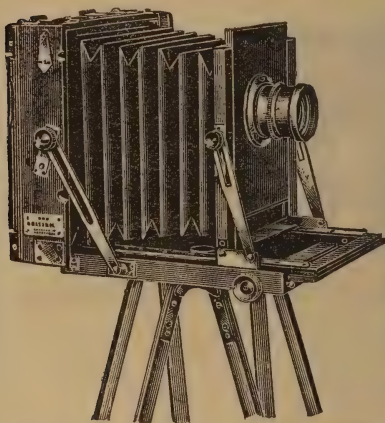
have only been on the market for one year, yet in that time they have taken first place among Roll Films both for speed and quality. As Mr. J. K. D. says: "They have given much better negatives for Snap-shots than I have ever had before."

SOLE MAKER:

AUSTIN EDWARDS, Warwick, England.

JOSIAH T. CHAPMAN'S

"British" • Stand • Cameras.



PRICE :—

Half-Plate Camera and
three double dark slides,
£5 0 0.

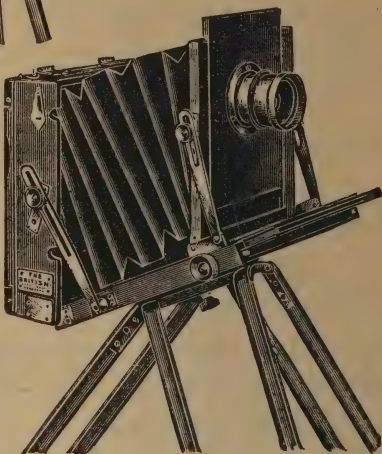
ILLUSTRATED PAMPHLET
POST FREE.

The "British" is a square camera fitted with a reversing back, so that either oblong or upright pictures may be taken without removing the camera from its support. It has a swing back and rising front, and when required for use in photographing high buildings or similar objects, which require the lens raised well above the centre of the plate the necessary amount of "rise" is easily obtained without any of the com-

plications to be found on most cameras now on the market. The bellows are more square than those of any other camera of similar pattern, and enable the use of a wide-angle lens without any danger of a portion of the view being cut off; even with the extra rise in use. For its simplicity of working and its quality of workmanship the "British" Camera cannot be equalled. The double dark slides are of the book-form and are fitted with safety catches to the shutters.

NOTE.

The "British" Camera has now been supplied, especially the larger sizes, to engineering and electrical works throughout the country, and has always given satisfaction; therefore it can be confidently recommended as the very best possible apparatus for this class of work.



JOSIAH THOMAS CHAPMAN,
Photographic Chemist,
Albert Square, MANCHESTER.

Telephone,
060.

Telegrams,
"Camera,
Manchester."

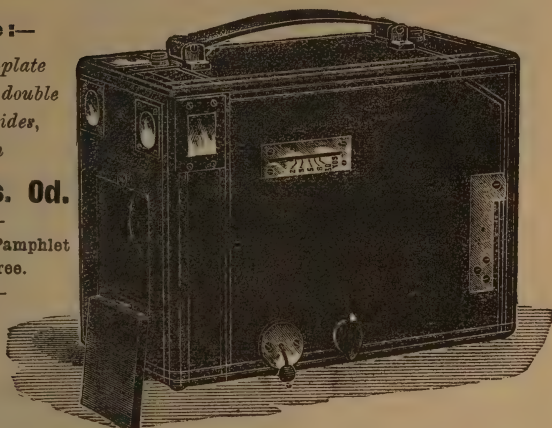
JOSIAH T. CHAPMAN'S
 "British"
 Hand or Stand Camera
 WITH DARK SLIDES.

Price:—

*Quarter-plate
 with three double
 dark slides,
 from*

£7 10s. 0d.

Illustrated Pamphlet
 Post Free.



This has been introduced to supply the want of a high-class camera, with dark slides, suitable for either hand or stand use. The camera, which is covered with best Morocco leather, is fitted with a Time and Instantaneous roller-blind shutter, with speed indicator, working from $\frac{1}{125}$ th to $\frac{1}{500}$ th of a second, an accurately engraved focussing scale, two brilliant view finders, and rising fronts; the whole being of the very best workmanship and finish. Three double slides, one of which is always in position ready for use, are carried in the camera, and by means of the ground glass focussing screen the picture may be composed before exposure, if necessary, thus making it the ideal camera for the tourist.

JOSIAH THOMAS CHAPMAN,

Telephone
 960.

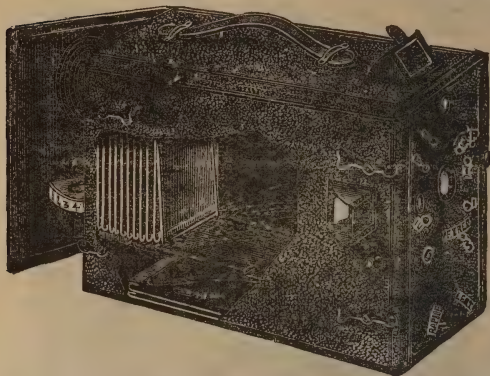
Photographic Chemist,

Albert Square, MANCHESTER,

Telegrams,
 "Camera,
 Manchester."

JOSIAH T. CHAPMAN'S

"Express" Hand Cameras.



ILLUSTRATED
PAMPHLETS
POST FREE ON
APPLICATION.



THE "EXPRESS"
CAMERAS are
made in three Series,
and are the most reli-
able Magazine Hand
Cameras on the mar-
ket; Well Finished and
Covered with Black
Leather.

No. 1 Carries twelve Plates and has a single Achromatic Lens with diaphragms. It is fitted with two brilliant View Finders, and a Time and Instantaneous Shutter, working at various speeds; and an Automatic Indicator showing the number of plates used. Price 30/-

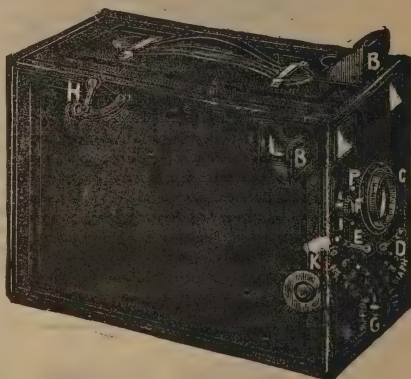
Carriage paid.

No. 2 Similar to the above, but with a Set of Magnifiers, enabling any object from four feet to infinity to be focussed. Price 40/-

Carriage paid.

No. 3 This is similar to the No. 2, but is Fitted with a Superior Quality **RAPID RECTILINEAR** Lens, giving good definition and depth of focus, thus making it an excellent Camera for portrait work as well as for general use. Price 65/-

Carriage paid.

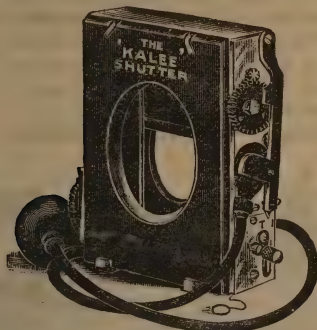


JOSIAH THOMAS CHAPMAN,
Photographic Chemist,
Albert Square, MANCHESTER.

Telephone
960.

Telegrams,
"Camera,
Manchester."

JOSIAH T. CHAPMAN'S
 "Kalee"
 Time or Instantaneous Shutter.



The "Kalee" is a very well-made Roller Blind Shutter, giving time or instantaneous exposures as desired, and is supplied in two patterns; for fitting either behind the lens or on the hood. It is fitted with a reliable Speed Indicator, and gives instantaneous exposures varying from 1-15th to 1-90th of a second.

Prices, complete with ball and tube:—

Up to 2-inch hood 12s.

Larger sizes 14s.

Full particulars and price lists sent post free.

ENLARGING AND OPTICAL LANTERNS.

Lantern Slides and all Accessories for the Lanternist.

Special Price List post free on application.

JOSIAH THOMAS CHAPMAN, Telegrams,
 Telephone, "Camera,
 960. Manchester."
 Photographic Chemist,
 Albert Square, MANCHESTER.

TELEPHONE: CENTRAL, 754.
TELEGRAMS: "OPSIOMETER," LONDON.

PHOTOGRAPHIC LENSES

A. E. STALEY & CO.,

IMPORTERS and MANUFACTURERS of every Description of
PHOTOGRAPHIC LENSES for the Trade.

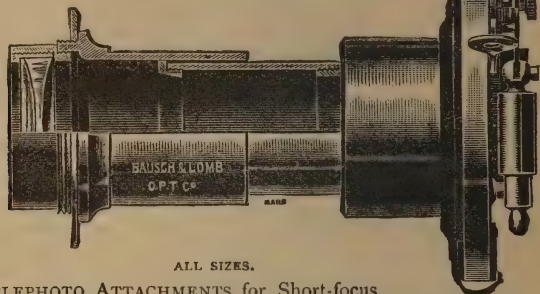
DEPOT FOR "KRAUSS ZEISS" LENSES. PLANAR, UNAR, and PROTAR.

BAUSCH & LOMB ZEISS PRISMATIC BINOCULARS.

BAUSCH & LOMB UNICUM, DIAPHRAGM, and
VOLUTE SHUTTERS.

TELEPHOTO LENSES.

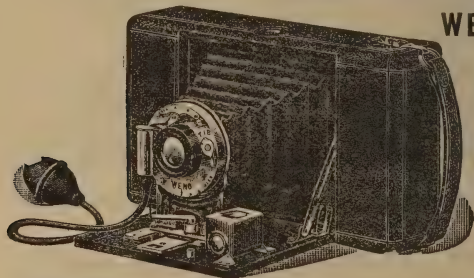
Write for Booklets.



ALL SIZES.

NEW TELEPHOTO ATTACHMENTS for Short-focus
Folding Cameras, specially constructed to fit on to
the Unicum Shutters for Cameras having bellows
extension of from $8\frac{1}{2}$ to 16 inches, either American or English models.

BAUSCH & LOMB'S MICROSCOPES, CENTRIFUGES, &c.



WENO CAMERAS.

Latest Novelty.

No. 3

Focussing Weno.

Daylight Loading
Film and
Plate Holders.

Dimensions, $3\frac{1}{2} \times 5\frac{3}{8} \times 9\frac{3}{8}$ inches. Size of photo, $3\frac{1}{2} \times 4\frac{1}{2}$ inches.

Weight, $3\frac{1}{2}$ pounds. Capacity, 12 exposures.

Double Extra Rapid Rectilinear Lens with focal length of 6 inches.

(See next page.)

PRICE LIST.

	£	s.	d.
No. 3 Focussing Weno, with B. & L. Automatic Shutter and Extra R.R. Lens, not loaded...	5	15	0
No. 3 Focussing Weno, without lens or shutter ...	4	17	6
No. 3 Focussing Weno, with B. & L. Automatic Shutter, no lens ...	5	5	0
No. 3 Focussing Weno, with No. 1 B. & L. Plastigmat Lens, EXTRA	7	2	0
Roll Film, 6 exposures ...	0	1	6
Roll Film, 12 exposures ...	0	3	0
Black Sole Leather Carrying Case, with Shoulder Strap ...	0	9	6
Also in 5 x 4 size. Cheaper Models $\frac{1}{2}$ P. Pocket size ..	3	3	0
Plate Holder ...	0	12	6

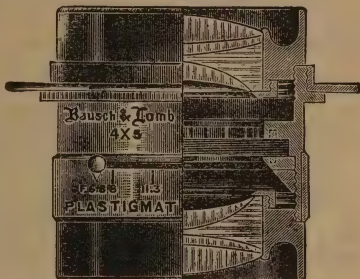
Price Lists on application.

The Latest Advance in Photographic Optics.

BAUSCH & LOMB'S NEW "PLASTIGMAT" LENS.

(U.S. Patent No. 663,747. Registered No. 237,806.)

F 6·8 More rapid than any other lens of equal aperture on account of purity of glass used, which is colourless, and being hard does not oxidise. No soft glass used in their construction. It is two lenses in one. The back combination can be used as an instantaneous lens, of about double focus of combination, the single combinations having the same anastigmatic and aplanatic corrections as the doublet lens, and the same brilliancy and freedom from distortion.

F 13·5

VERY LIBERAL TERMS TO DEALERS.

We fit Plastigmat Lenses to Clients' Kodak Cameras, with the New Unicum Shutter.

Bausch & Lomb's New Automatic Gem and Unicum Shutters.

**BAUSCH & LOMB OPTICAL CO., Rochester, N.Y., New York
and Chicago, U.S.A.**
Full Price List on application.**VIEW FINDERS AND PHOTOGRAPHIC SUNDRIES.**

LENS MOUNTING AND FINISHING FOR THE TRADE.

Price Lists through any Dealer.**"RAY" and "PREMO" Cameras.**

NEW LISTS READY SHORTLY.

A. E. STALEY & CO.,

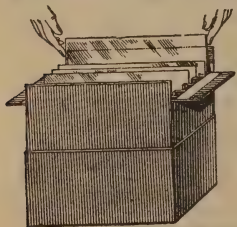
35, ALDERMANBURY, LONDON, E.C.

[See preceding pages.]

LIGHT-TIGHT BOXES

FOR

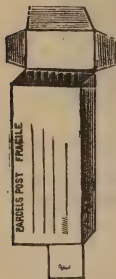
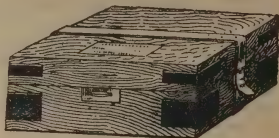
DRY PLATES, LANTERN SLIDES, &c.



Prize Medal, 1887.

Fitted with Metallic Grooving, that occupies far less space than the ordinary wood grooving, so being compact and serviceable for Storing Negatives.

SPECIALTY.—Boxes for the safe transmission of Lantern Slides by rail or otherwise. Exceedingly useful to Lantern Societies and Clubs.



PARCELS POST BOXES for sending one or more Bottles safely through the Post, ready for addressing and sealing down.

TUBES for Sensitized Paper, with Light-tight Ends,



or Open for sending Paper or Photographs by Post.

ARUNDEL & MARSHALL,
Penn Street Works,
HOXTON, LONDON, N.

Manufacturers of all Descriptions of Boxes required in all Branches of the Photographic Trade.

Price Lists on Application. Telegraphic Address, "Archway, London."

Telegraphic Address, "PLATES, ILFORD."

Telephone - - - No. 14, ILFORD.

PRICE LIST OF



REGD. TRADE MARK.

ILFORD



REGD. TRADE MARK.

PHOTOGRAPHIC GOODS.

**24 Years' Reputation for
Excellence,
Uniformity,
Cheapness.**

ILFORD, Limited,

Ilford, London, England.

UNIFORM PRICES FOR ALL VARIETIES.

ILFORD Plates.

Colour of Label.
 Ordinary.....Yellow
 EmpressSalmon
 Special RapidRed
 Chromatic ...Green & white

Colour of Label.
 Process.....Black & white
 Half Tone.....White & red
 Special Lantern ...Blue & white
 Alpha Lantern ...Red & white

PRICES PER DOZEN.

$2\frac{5}{16} \times 1\frac{3}{4}$	.....	0s. 6d.
$2\frac{1}{2} \times 2\frac{1}{2}$	.....	0s. 9d.
$3\frac{1}{4} \times 2\frac{1}{4}$	.....	0s. 9d.
$3\frac{1}{2} \times 2\frac{1}{2}$	.....	0s. 9d.
$3\frac{1}{4} \times 3\frac{1}{4}$	.....	1s. 0d.
$3\frac{1}{2} \times 3\frac{1}{2}$	.....	1s. 0d.
$4\frac{1}{4} \times 3\frac{1}{4}$ ($\frac{1}{4}$ plate)	.....	1s. 0d.
5×4	.....	1s. 7d.
$6\frac{3}{4} \times 3\frac{1}{4}$	.....	1s. 10d.
$6\frac{1}{2} \times 4\frac{1}{4}$	.....	2s. 2d.
$6\frac{1}{2} \times 4\frac{3}{4}$ ($\frac{1}{2}$ plate)	.....	2s. 3d.
7×5	.....	3s. 0d.
$7\frac{1}{2} \times 5$	.....	3s. 5d.
8×5	.....	3s. 9d.
$8\frac{1}{2} \times 6\frac{1}{2}$ (whole plate)	.....	4s. 3d.
9×7	.....	5s. 0d.
10×8	.....	7s. 3d.
12×10	.....	10s. 6d.
15×12	.....	18s. 0d.
18×16	.....	32s. 6d.
20×16	} to order	36s. 0d.
22×18		48s. 0d.
24×20		59s. 0d.

ALL OTHER SIZES TO ORDER, at special prices. $8\frac{1}{2} \times 6\frac{1}{2}$ are packed in half-dozens, to order, at 6d. per dozen extra. 10×8 and 12×10 packed in $\frac{1}{2}$ dozens to order; 15×12 in half-dozens. Sizes over 15×12 packed in $\frac{1}{3}$ dozens without extra charge.

POSTAGE EXTRA.

For Continental Sizes see page 571.

All ILFORD Plates are alike in
PRICE, RELIABILITY, & UNIFORMITY
 They differ only in Speed.

Proportionate Speed of Plates, &c., in seconds exposure required:

ORDINARY & CHROMATIC.	EMPRESS.	SPECIAL RAPID.	PROCESS.
1	$\frac{1}{2}$	$\frac{1}{4}$	8
HALF-TONE.	SPECIAL LANTERN.	RAPID BROMIDE.	SLOW BROMIDE.
$1\frac{1}{2}$	50	5	20

FOR EVERYDAY WORK, both in studio and field, the

ILFORD ORDINARY

are recommended.

FOR DULL WEATHER AND FOR RAPID EXPOSURES in studio or with hand cameras the

ILFORD EMPRESS

are best.

FOR QUICK SHUTTER EXPOSURES in studio, for VERY DULL DAYS, and for INSTANTANEOUS EXPOSURES (SNAP-SHOTS) the

ILFORD SPECIAL RAPID

will be found desirable.

FOR LANDSCAPE WORK of every description, and for copying pictures, for cloud and snow subjects, and photo-micrographs

ILFORD CHROMATIC

are to be preferred. They are the best Isochromatic or Orthochromatic Plates produced.

When the subject reflects a large proportion of green and yellow rays, or when the light is hazy or yellowish, the relative speed of Ilford Chromatic plates is much higher. (See Pamphlet).

ILFORD 'SPECIAL' LANTERN PLATES

Give slides of unusual brilliancy, clear highlights and transparent shadows. They can be used either for Contact or Reduction Printing, with a considerable range of tone—FROM COLD TO WARM BLACK.

ILFORD 'ALPHA' LANTERN PLATES

Are for Contact Printing only, and give slides of beautiful warm brown and red tones. Other shades can be obtained by toning.

Ilford Alpha Lantern Plates are entirely UNIQUE.

For full Instructions see Pamphlet :

"Ilford Lantern Plates and How to Use them." Sent post free.

FOR PHOTO-MECHANICAL WORK,

SPECIAL The ILFORD "PROCESS" Plate
PAMPHLET Is the Best DRY Plate ever made for LINE work.
FREE
TO The
PROCESS ILFORD "HALF-TONE" Plate
WORKERS. Is specially recommended for HALF-TONE work.

ANTI-HALATION PLATES

All **ILFORD** Plates are supplied **BACKED**
 to order at the following Prices:

$\frac{1}{4}$ plate	1s. 3d.	12 × 10	12s. 0d.
$\frac{1}{2}$ "	2s. 9d.	15 × 12	20s. 0d.
$\frac{1}{1}$ "	5s. 0d.	20 × 16	39s. 0d.
10 × 8	8s. 3d.	<i>Other sizes at proportionate prices.</i>	

A Soluble Backing, Easy to Remove, and Does not Chip.

PRICES OF

ILFORD Plates

IN CONTINENTAL SIZES.

PER DOZEN.

Centimètres.

$4\frac{1}{2} \times 6$	.....	.....	.....	0s. 6d.
$6\frac{1}{2} \times 9$	.....	.....	.....	0s. 10d.
Vérascopes	.....	.....	.....	0s. 10d.
9×12	.....	.....	.....	1s. 4d.
$12 \times 16\frac{1}{2}$	.....	.....	.....	2s. 3d.
13×18	.....	.....	.....	2s. 8d.
18×24	.....	.....	.....	5s. 0d.
24×30	.....	.....	.....	10s. 0d.
30×40 packed in $\frac{1}{2}$ dozens	.....	.....	.....	20s. 0d.
40×50 „ $\frac{1}{3}$ „	.....	.....	.....	34s. 0d.

And in every other size at special prices.

(For Films see next page.)

All ILFORD Plates can be had on extra thin glass to order at special prices.

Postage extra.

ILFORD Films.

**Special Advantages:—Lightness, Portability, and
Freedom from Breakage.**

IN THREE VARIETIES.

EMPRESS (Salmon Packet)

SPECIAL RAPID (Red Packet)

and (to order)

CHROMATIC

PRICES. Per dozen.	Empress.	Special Rapid and Chromatic.
$3\frac{1}{2} \times 2\frac{1}{2}$	1s. 0d.	1s. 6d.
$4\frac{1}{4} \times 3\frac{1}{4}$	1s. 6d.	2s. 0d.
5×4	2s. 6d.	3s. 0d.
$6\frac{1}{2} \times 4\frac{3}{4}$	3s. 8d.	4s. 6d.
$8\frac{1}{2} \times 6\frac{1}{2}$	6s. 6d.	8s. 0d.
10×8	10s. 0d.	12s. 0d.

Postage extra.

CONTINENTAL SIZES. Per dozen.

Centimètres.	Empress.	Special Rapid and Chromatic.
$6\frac{1}{2} \times 9$	1s. 0d.	1s. 6d.
9×12	2s. 0d.	2s. 10d.
$12 \times 16\frac{1}{2}$	3s. 8d.	4s. 6d.
13×18	4s. 0d.	5s. 3d.
18×24	8s. 0d.	10s. 0d.

(And in any other sizes at special prices.)

Postage extra.

ILFORD**P.O.P.**
Reg. Trade Mark

A GELATINO-CHLORIDE PRINTING-OUT
PAPER OF EXQUISITE QUALITY.

Used throughout the World.

Made in five Varieties at the same Prices.

GLOSSY surface :

WHITE, MAUVE, PINK,
and SPECIAL For producing Soft Prints
from Hard Negatives.

MATT surface :

WHITE only.

Prices of ILFORD P.O.P.

TUBES.

			Price.	With Postage.
Inches. 24½ × 17	2 Sheets	....	1s. 4d.	... 1s. 6d.
	6 "	...	4s. 0d.	... 4s. 3d.
	12 " (½ quire)	...	7s. 6d.	... 7s. 10d.
24 × 20	2 Sheets	...	1s. 9d.	... 2s. 0d.
	6 "	...	4s. 6d.	... 4s. 9d.
	12 " (½ quire)	...	8s. 9d.	... 9s. 1d.

PRICES OF ILFORD P.O.P. (continued.)

PACKETS.

				Post free.	
$2\frac{5}{16} \times 1\frac{3}{4}$	... 60	pieces	...	0s. 6d.	0s. 7d.
$2\frac{1}{2} \times 2\frac{1}{2}$	... 40	"	...	0s. 6d.	0s. 7d.
$3\frac{1}{4} \times 2\frac{1}{4}$	... 34	"	...	0s. 6d.	0s. 7d.
$3\frac{1}{2} \times 2\frac{1}{2}$	... 28	"	...	0s. 6d.	0s. 7d.
$3\frac{1}{4} \times 3\frac{1}{4}$	... 23	"	...	0s. 6d.	0s. 7d.
$3\frac{3}{8} \times 3\frac{1}{8}$	... 23	"	...	0s. 6d.	0s. 7d.
$3\frac{1}{2} \times 3\frac{1}{2}$	... 20	"	...	0s. 6d.	0s. 7d.
$4\frac{1}{4} \times 3\frac{1}{4}$	... 36	"	...	1s. 0d.	1s. 1d.
5×4	... 24	"	...	1s. 0d.	1s. 1d.
$6 \times 4\frac{1}{4}$	... 24	"	...	1s. 0d.	1s. 2d.
$6\frac{1}{2} \times 4\frac{1}{2}$	... 16	"	...	1s. 0d.	1s. 2d.
7×5	... 14	"	...	1s. 0d.	1s. 2d.
$7\frac{1}{2} \times 5$	... 13	"	...	1s. 0d.	1s. 2d.
$8\frac{1}{2} \times 6\frac{1}{2}$	... 9	"	...	1s. 0d.	1s. 2d.
10×8	... 6	"	...	1s. 0d.	1s. 2d.
12×10	... 8	"	...	2s. 0d.	2s. 3d.

BOXES.

				Post free	
$3\frac{1}{2} \times 2\frac{1}{4}$	No. 2 C.D.V.	144 pieces	1s. 8d.	...	1s. 10d.
$3\frac{3}{8} \times 2\frac{3}{8}$	" 1 "	144 "	1s. 10d.	...	2s. 0d.
$5\frac{1}{2} \times 4$	" 2 Cabinet	144 "	4s. 8d.	...	4s. 11d.
$5\frac{3}{4} \times 4$	" 1 "	144 "	5s. 0d.	...	5s. 3d.
8×6	...	144 "	10s. 6d.	...	10s. 11d.

All other sizes in packets or boxes; Prices on application.

Continental Sizes, per Packet.

Centimètres.

$4\frac{1}{2} \times 6$	... 48	pieces	...	0s. 5d.
$6\frac{1}{2} \times 9$	... 24	"	...	0s. 5d.
9×9	... 17	"	...	0s. 5d.
9×12	... 24	"	...	0s. 10d.
$12 \times 16\frac{1}{2}$	... 15	"	...	0s. 10d.
13×18	... 12	"	...	0s. 10d.
18×24	... 7	"	...	0s. 10d.
24×30	... 4	"	...	0s. 10d.

And in **all other sizes**. Prices on application.

Postage extra.

For Continental sizes in Plates see page 571.

"Ilford P.O.P. & How to Use it." Illustrated, 40 pp. Post Free.

ILFORD Bromide Paper.

PERFECTLY MATT SURFACE.

THE FIRST INTRODUCED & NEVER EQUALLED.

Made in five Varieties at the same Prices.

Rough Slow (R.S.)

Smooth Slow (S.S.)

Rough Rapid (R.R.)

Smooth Rapid (S.R.)

Platino-Matt-Surface (P.M.S.) for Beautifully Artistic

Effects. Heavy Paper. Brilliant Whites. Rich Blacks.

PRICES.

$2\frac{5}{16} \times 1\frac{3}{4}$	...	...	...	40 pieces	...	0s. 6d.	
$2\frac{1}{2} \times 2\frac{1}{2}$	...	...	...	28 "	...	0s. 6d.	
$3\frac{1}{2} \times 2\frac{1}{2}$	...	...	...	20 "	...	0s. 6d.	
$3\frac{1}{2} \times 3\frac{1}{2}$	...	...	...	14 "	...	0s. 6d.	
$4\frac{1}{4} \times 3\frac{1}{4}$	...	...	...	12 "	...	0s. 6d.	
5×4	...	...	...	12 "	...	0s. 9d.	
$6 \times 4\frac{1}{4}$	...	...	...	12 "	...	0s. 10d.	
$6\frac{1}{2} \times 4\frac{1}{2}$	...	...	...	12 "	...	1s. 0d.	
$7\frac{1}{2} \times 5$	...	...	...	12 "	...	1s. 3d.	
$8\frac{1}{2} \times 6\frac{1}{2}$	...	...	...	12 "	...	1s. 11d.	
10×8	...	...	...	12 "	...	2s. 9d.	
$12\frac{1}{2} \times 10\frac{1}{2}$	...	...	...	12 "	...	4s. 0d.	} In pkts. of 6 pieces to order.
$15\frac{1}{2} \times 12\frac{1}{2}$	...	...	...	12 "	...	6s. 6d.	
18×15	...	In tubes of 6 sheets			...	4s. 9d.	
20×16	...	...	"	6 "	...	5s. 6d.	
23×17	...	...	"	6 "	...	6s. 9d.	
$24\frac{1}{2} \times 19$	...	...	"	6 "	...	7s. 6d.	
Rolls.							
10-ft. $\times 24\frac{1}{2}$ in...	...	...	...	...	...	8s. 6d.	each.
10-ft. $\times 34$ in...	...	...	...	...	...	12s. 0d.	"
20-ft. $\times 34$ in...	...	...	...	...	...	24s. 0d.	"

Postage extra.

And in all other sizes in packets or boxes. Prices on application.

Ilford Alpha Paper supplied to order at the same Prices as Bromide Papers.

ILFORD Bromide Opals

are made in one speed, *slow*, and have all the good qualities of Ilford Bromide Paper, with the special characteristics of Opal glass.

			PER	DOZEN.			
$4\frac{1}{4} \times 3\frac{1}{4}$ ($\frac{1}{4}$ plate)	...	1s. 6d.	||	9×7	...	8s. 0d.	
5×4	...	2s. 6d.	||	10×8	...	10s. 0d.	
$6\frac{1}{2} \times 4\frac{3}{4}$ ($\frac{1}{2}$ plate)	...	3s. 8d.	||	12×10	...	16s. 0d.	
$7\frac{1}{2} \times 5$	...	5s. 3d.	||	15×12	...	24s. 0d.
$8\frac{1}{2} \times 6\frac{1}{2}$ (whole plate)	...	6s. 6d.					

Postage extra. Packed in $\frac{1}{2}$ dozens.

In sizes under $8\frac{1}{2} \times 6\frac{1}{2}$ not less than 1 dozen supplied.

ILFORD GASLIGHT PAPER.

Ilford Gaslight Paper can be exposed, developed, and fixed by gaslight, lamplight, or other artificial light.

No Dark Room Needed.

PACKETS.

$2\frac{5}{8} \times 1\frac{3}{4}$	...	...	...	40 pieces	...	0s. 6d.	
$2\frac{1}{2} \times 2\frac{1}{2}$	...	...	...	28 "	...	0s. 6d.	
$3\frac{1}{2} \times 2\frac{1}{2}$	...	...	...	20 "	...	0s. 6d.	
$3\frac{1}{2} \times 3\frac{1}{2}$	...	...	...	14 "	...	0s. 6d.	
$4\frac{1}{4} \times 3\frac{1}{2}$	...	...	...	12 "	...	0s. 6d.	
5×4	...	...	...	12 "	...	0s. 9d.	
$6 \times 4\frac{1}{4}$	...	...	...	12 "	...	0s. 10d.	
$6\frac{1}{2} \times 4\frac{3}{4}$	...	...	...	12 "	...	1s. 0d.	
$7\frac{1}{2} \times 5$	...	...	...	12 "	...	1s. 3d.	
$8\frac{1}{2} \times 6\frac{1}{2}$	...	...	...	12 "	...	1s. 11d.	
10 \times 8	...	...	...	12 "	...	2s. 9d.	
12 \times 10	...	...	...	12 "	...	4s. 0d.	In pkts. of 6
15 \times 12	...	...	...	12 "	...	6s. 0d.	pieces to order.

Postage extra.

And in all other sizes. Prices on application.

ILFORD Gaslight Post Cards.

Packets of 12 (with Masks), 1s. Post Free 1s. 1d.

Prices of ILFORD

Bromide & Gaslight Papers

IN CONTINENTAL SIZES.

PACKETS.

Centimètres.

$4\frac{1}{2} \times 6$	...	...	...	40 pieces	...	...	0s. 6d.
$6\frac{1}{2} \times 9$	...	...	...	20 "	...	...	0s. 6d.
9×9	...	...	...	14 "	...	...	0s. 6d.
9×12	...	...	...	12 "	...	...	0s. 9d.
$12 \times 16\frac{1}{2}$	...	...	...	12 "	...	...	1s. 0d.
13×18	...	...	...	12 "	...	...	1s. 3d.
18×24	...	...	...	12 "	...	...	2s. 5d.
24×30	...	...	...	12 "	...	...	4s. 0d.

Postage extra.

And in all other sizes in Packets, Boxes, Tubes, or Rolls.

Prices on application.

ILFORD



A GENUINE
PLATINUM
PAPER AT
POPULAR
PRICES.

Paper.

(ILFORD PLATINUM PAPER.)

In Two Varieties, Rough and Smooth.

PRICES in sealed Tin Tubes.

			Per Tin.	With postage.
$4\frac{1}{4} \times 3\frac{1}{4}$	..... 20 pieces	.....	1s. 0d.	..... 1s. 2d.
5×4	..... 20 „	.....	1s. 8d.	..... 1s. 10d.
$6 \times 4\frac{1}{4}$	..... 20 „	.....	2s. 0d.	..... 2s. 2d.
$6\frac{1}{2} \times 4\frac{3}{4}$	..... 20 „	.....	2s. 3d.	..... 2s. 6d.
$8\frac{1}{2} \times 6\frac{1}{2}$	..... 20 „	.....	4s. 0d.	..... 4s. 3d.
10×8	..... 20 „	.....	5s. 9d.	..... 6s. 0d.
12×10	..... 10 „	.....	4s. 6d.	..... 4s. 9d.
15×12	..... 10 „	.....	6s. 6d.	..... 6s. 9d.
$24\frac{1}{2} \times 17$	{ 2 sheets	.....	2s. 9d.	..... 3s. 0d.
		6 „	8s. 0d.	..... 8s. 4d.
		12 „ ($\frac{1}{2}$ -quire)	16s. 0d.	..... 16s. 5d.

KALONA.

(REGISTERED).

The ILFORD Self-Toning Paper.

SIMPLE, RELIABLE, DURABLE.

IN **TWO** VARIETIES, GLOSSY AND MATT
at the same prices.

PACKETS.

$2\frac{1}{2} \times 1\frac{1}{2}$...	28 pieces	} 6^d.
$3\frac{1}{2} \times 2\frac{1}{2}$	...	20 "
$3\frac{1}{4} \times 3\frac{1}{4}$	...	16 "
$3\frac{1}{2} \times 3\frac{1}{2}$	...	14 "
$4\frac{1}{4} \times 3\frac{1}{4}$...	28 pieces	} 1/-
5×4	...	19 "	
$6 \times 4\frac{1}{4}$	...	15 "
$6\frac{1}{2} \times 4\frac{3}{4}$	...	12 "
7×5	...	11 "	
$7\frac{1}{2} \times 5$	...	10 "
$8\frac{1}{2} \times 6\frac{1}{2}$	...	7 "
10×8	...	4 "	
12×10	...	6 pieces	2s. 0d.

BOXES
OF 144 PIECES.

$3\frac{1}{2} \times 2\frac{1}{4}$	...	...	2s. 9d.
$3\frac{5}{8} \times 2\frac{3}{8}$	...	...	3s. 0d.
$5\frac{1}{2} \times 4$	...	...	7s. 6d.
$5\frac{3}{4} \times 4$	...	...	8s. 0d.
8×6	...	...	16s. 6d.

TUBES.

2 sheets, $24\frac{1}{2} \times 17$	1s. 11d.
6 " " " "	5s. 8d.
12 " " " "	11s. 0d.

CONTINENTAL SIZES, per Packet

Centimètres.

$6\frac{1}{2} \times 9$...	38 pieces	} 1/-
9×9	...	28 "	
9×12	...	22 "	
$12 \times 16\frac{1}{2}$	...	12 "

Centimètres.

13×18	...	10 pieces	} 1/-
18×24	...	5 "	
24×30	...	6 pieces	2s. 0d.

Postage Extra.

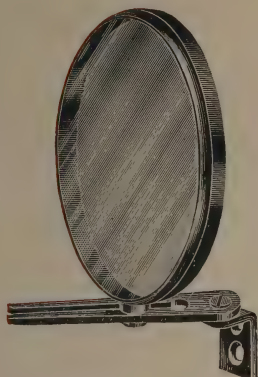
When Matt Kalona is required it should be distinctly ordered, otherwise
Glossy will be sent.

Entire Batches of Prints **ALL** perfectly UNIFORM
IN TONE without any difficulty.

ILFORD SCREENS,

For use with Chromatic Plates.

A.



B.



	2-in.	3-in.	4-in.
Screen & Holder A in Case	7s. 6d.	15s. 0d.	28s. 0d.
Post free	7s. 9d.	15s. 3d.	28s. 3d.
Screen alone	4s. 0d.	10s. 0d.	17s. 6d.
Post free	4s. 3d.	10s. 3d.	17s. 9d.
Screen & Holder B in Box	3s. 6d.	—	—
Post free	3s. 8d.	—	—

Can be had from all Dealers.

Other sizes to order.

The screen glasses are made in two tints—No. 1 for average everyday work, necessitates three times the exposure; No. 2 for copying and extreme subjects, necessitates six times the exposure.

ILFORD Exposure Meter.

(Professor Scott's Patent.)

PRICES.

In Card	1s. 0d.
Post Free	1s. 1d.
In Aluminium	5s. 0d.
Post Free	5s. 2d.

A
PRACTICAL
AND
RELIABLE



AID TO
CORRECT
EXPOSURE.

"The Ilford Exposure Meter and how to use it," Post Free.)

NEW EDITION REVISED AND ENLARGED.

ILFORD MANUAL OF PHOTOGRAPHY.

(BY C. H. BOTHAMLEY, F.C.S., F.I.C., etc., etc.)

218 pp. Illustrated.

165th Thousand.

The most popular and useful photographic Text-book ever published.

CLEAR, SIMPLE, CONCISE, & EXHAUSTIVE.

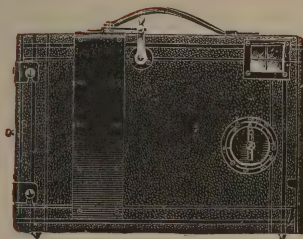
Price 1s. 0d. from all Dealers. Post free 1s. 3d.

THE
Ilford Camera
(PATENT.)

QUARTER-PLATE CUT FILM
MAGAZINE HAND-CAMERA.

Can be fully loaded in less than a minute.

Forty Exposures without reloading.



Bausch & Lomb R.R. Lens and Unicum Shutter,

PRICE (without Films) **£5.**

Extra Quality

with Ross Symmetric Anastigmat Lens and Lopa Patent Shutter

(without Films) **£8. 8. 0.**

ILFORD SPECIAL RAPID FILMS
ILFORD CHROMATIC FILMS

for the Ilford Camera, in boxes of 20, **3s. 4d.** per box.

Postage extra.

Photographic Scraps

THE ILFORD JOURNAL.



CIRCULATION 40,000 MONTHLY.

Full of information interesting to all classes of Photographers.

Gratis from all Dealers, or free by post for one year
on receipt of six penny stamps.

The ILFORD EVERY-DAY BOOK, New Edition,

Showing in brief what dangers await the unwary Photographer,
how he may recognise them, and how avoid them in future.

In addition we publish the following PAMPHLETS, and shall be happy
to forward copies of each or all to anyone, on receipt of one Penny Stamp.

Ilford PLATES.

Ilford P.O.P. (Complete Instructions.)

Ilford CHROMATIC PLATES.

Ilford EXPOSURE METER.

Ilford LANTERN PLATES.

Ilford BROMIDE PAPER and How to use it.

NOTES ON PLATONA.

NOTES ON DRY PLATES for PROCESS WORK.

Copies can be obtained free from all Dealers.

'77 WRATTEN'S '03

'LONDON' PLATES

ALWAYS
THE BEST CLIMATE
RESISTANTS.

JANUARY.

D. M.	D. W.	REMARKABLE EVENTS.	SUN.			MOON.		
			Rises.	Sets.		Rises.	Sets.	
			H. M.	H. M.		Morn.	After.	
1	Th		8 8	3 59		9 8	7 3	
2	F		8 8	4 0		9 35	8 5	
3	S	Prof. J. W. Draper d. 1882	8 8	4 1		10 0	9 10	
4	S	2nd Sunday after Christmas	8 8	4 2		10 24	10 17	
5	M		8 8	4 3		10 47	11 25	
6	Tu	Epiphany) 9.57 A.	8 8	4 4		11 12	Morn	
7	W	Daguerreotype com. to Acad. of Sc.	8 7	4 5		11 39	0 34	
8	Th	[(Paris), 1839]	8 7	4 7		After	1 45	
9	F		8 6	4 8		0 47	2 57	
10	S		8 6	4 10		1 31	4 9	
11	S	1st Sunday after Epiphany	8 5	4 11		2 25	5 19	
12	M		8 5	4 12		3 31	6 23	
13	Tu	William Bedford d. 1893 O 2.17 A.	8 4	4 13		4 46	7 18	
14	W		8 3	4 15		6 5	8 3	
15	Th	G. W. Simpson d. 1880	8 2	4 16		7 25	8 40	
16	F		8 2	4 18		8 43	9 11	
17	S		8 1	4 20		9 58	9 40	
18	S	2nd Sunday after Epiphany E.	8 0	4 22		11 11	10 7	
19	M	[Lacan d. 1879. Rejander d. 1875.	7 59	4 23		Morn	10 33	
20	Tu	Photo. Soc. of Lon. f. 1853 (11.49 M.	7 58	4 25		0 21	10 59	
21	W	Fox Talbot b. 1800	7 57	4 26		1 28	11 27	
22	Th	Sir W. Newton d. 1869	7 56	4 28		2 30	11 58	
23	F		7 55	4 30		3 29	After	
24	S		7 54	4 32		4 25	1 17	
25	S	3rd Sunday after Epiphany	7 52	4 33		5 15	2 4	
26	M		7 51	4 35		5 58	2 56	
27	Tu	[Willème, 1863]	7 50	4 37		6 37	3 53	
28	W	Photo-sculpture pat. by ● 4.39 A.	7 49	4 39		7 11	4 54	
29	Th	[Royal Soc. 1839]	7 47	4 40		7 40	5 57	
30	F	Fox Talbot's first communication to	7 46	4 42		8 7	7 2	
31	S		7 44	4 44		8 32	8 8	

RESIDUES

Reduce
every description
of
PHOTOGRAPHIC
RESIDUES.

CONSIGNMENTS AND
REMITTANCES
PUNCTUALLY
ATTENDED TO.

J., J. J. & T. G. BLUNDELL, Gold, Silver, & Platinum Refiners & Dealers,

199 (formerly 162), WARDOUR STREET, LONDON, W.

The 'LONDON' PLATES

Prices and Particulars of all Dealers, or direct from the Manufacturers,

WRATTEN & WAINWRIGHT, CROYDON, SURREY.

FEBRUARY.

D. M.	D. W.	REMARKABLE EVENTS.	SUN.		MOON.	
			Rises.	Sets.	Rises.	Sets.
			H. M.	H. M.	Morn.	After.
1	S	4th Sunday after Epiphany	7 42	4 46	8 56	9 15
2	M		7 41	4 48	9 19	10 23
3	Tu		7 39	4 49	9 44	11 32
4	W		7 38	4 51	10 13	Morn
5	Th	) 10.13 M.	7 36	4 53	10 45	0 42
6	F		7 35	4 55	11 24	1 53
7	S		7 33	4 57	After	3 2
8	S	Septuagesima Sunday Calotype	7 31	4 59	1 11	4 7
9	M	[Process pat. 1841	7 29	5 0	2 19	5 4
10	Tu	Sir David Brewster d. 1868	7 28	5 2	3 34	5 52
11	W		7 26	5 4	4 53	6 32
12	Th	○ 0.58 M.	7 24	5 6	6 13	7 7
13	F	Leon Foucault d. 1868	7 22	5 8	7 31	7 38
14	S	St. Valentine	7 20	5 10	8 47	8 6
15	S	Sexagesima Sunday	7 18	5 11	10 0	8 33
16	M		7 16	5 13	11 10	9 0
17	Tu	[portraiture) pat. 1857	7 14	5 15	Morn	9 29
18	W	Moule's Photogen (artificial light for	7 12	5 17	0 16	10 0
19	Th	(6.23 M. [1855	7 10	5 19	1 19	10 35
20	F	Poitevin's p. of Helioplastie pub.	7 8	5 21	2 17	11 15
21	S	H. P. Robinson d. 1901, aged 71	7 6	5 22	3 9	Aft-r
22	S	Quinquagesima Sunday	7 4	5 24	3 55	0 51
23	M		7 2	5 26	4 36	1 46
24	Tu		7 0	5 28	5 11	2 45
25	W		6 58	5 29	5 42	3 47
26	Th	Senefelder d. 1834. Padre Secchi d.	6 56	5 31	6 10	4 52
27	F	● 10.20 M. [1876. Arago b. 1786	6 54	5 33	6 36	5 58
28	S		6 52	5 35	7 0	7 5

RESIDUES

Nitrate of Silver
Chloride of Gold &
(best quality only).

**MELTING and
ASSAYING**
done for the trade.

J., J. J. & T. G. BLUNDELL, Gold, Silver, & Platinum Refiners & Dealers,

199 (formerly 162), WARDOUR STREET, LONDON, W.

SPECIFY ALWAYS . .

WRATTEN'S 'LONDON' PLATES.

M A R C H .

D. M.	D. W.	REMARKABLE EVENTS.	SUN.		MOON.	
			Rises. H. M.	Sets. H. M.	Rises. Morn.	Sets. After.
1	S	1st Sunday in Lent	6 50	5 36	7 24	8 13
2	M		6 48	5 38	7 50	9 23
3	Tu		6 46	5 40	8 18	10 34
4	W	Poitevin d. 1882	6 44	5 42	8 49	11 44
5	Th	La Place d. 1827. J. Albert b. 1825	6 41	5 44	9 26	Morn
6	F	Fraunhofer b 1787) 7.14 A.	6 39	5 46	10 10	0 51
7	S	J.N Niepce b 1765. Herschel b. 1792	6 37	5 47	11 3	1 55
8	S	2nd Sunday in Lent	6 35	5 49	After	2 54
9	M	G. W. Wilson d. 1893	6 32	5 51	1 13	3 44
10	Tu		6 30	5 53	2 28	4 26
11	W	St. Claire Deville b. 1818	6 28	5 54	3 45	5 3
12	Th		6 26	5 56	5 3	5 35
13	F		6 23	5 57	6 21	6 4
14	S	Herschel int. hypo for fixing, 1839	6 21	5 59	7 36	6 32
15	S	3rd Sunday in Lent	6 19	6 1	8 48	7 0
16	M		6 17	6 3	9 57	7 28
17	Tu		6 14	6 4	11 3	7 59
18	W		6 12	6 6	Morn	8 32
19	Th	Thomas Sutton d. 1875	6 10	6 7	0 4	9 11
20	F		6 8	6 9	0 58	9 54
21	S		6 5	6 11	1 47	10 43
22	S	4th Sunday in Lent	6 3	6 13	2 30	11 36
23	M		6 1	6 14	3 9	After
24	Tu	Becquerel b. 1820	5 59	6 16	3 42	1 35
25	W	Hermagis d. 1868	5 56	6 17	4 11	2 38
26	Th		5 54	6 19	4 38	3 43
27	F		5 52	6 21	5 3	4 50
28	S	La Place b. 1749	5 50	6 23	5 27	6 0
29	S	5th Sunday in Lent	5 47	6 24	5 52	7 11
30	M		5 45	6 26	6 20	8 22
31	Tu		5 42	6 28	6 51	9 34

RESIDUES

**COMPLETE
RECOVERY
of
GOLD, SILVER,
AND PLATINUM
guaranteed, and
Full Market Value
allowed.**

J., J. J. & T. G. BLUNDELL, Gold and Silver Refiners and Melters,
199⁷(formerly 162), **WARDOUR STREET, LONDON, W.**

WRATTEN'S 'LONDON'

"The most Useful Plate for
GENERAL PHOTOGRAPHY in
any climate."

INSTANTANEOUS (Yellow Label).

APRIL.

D. M.	D. W.	REMARKABLE EVENTS.	SUN.		MOON.	
			Rises.	Sets.	Rises.	Sets.
			H. M.	H. M.	Morn.	After.
1	W		5 40	6 29	7 27	10 44
2	Th	First Sun Pho. by F zeau and Fou-	5 38	6 31	8 9	11 50
3	F	[cault, 1845. Morse d. 1872	5 36	6 33	8 59	Morn
4	S	[5-Rev. J. B. Reade b. 1801	5 34	6 35	9 58	0 49
5	S	Palm Sunday) 1.51 M.	5 31	6 36	11 5	1 42
6	M	[Victor d. 1870	5 29	6 38	After	2 26
7	Tu	Voigländer d. 1878. Niepce d. S.	5 27	6 39	1 30	3 3
8	W	[1839	5 25	6 41	2 45	3 55
9	Th	Fox Talbot's First Art in <i>Athenæum</i> ,	5 22	6 43	4 0	4 4
10	F	Pouney's Carb. Process pat. 1856.	5 20	6 45	5 14	4 32
11	S	[Clarence Fry d. 1897	5 18	6 46	6 27	4 59
12	S	Easter Sunday ○ 0.18 M.	5 16	6 48	7 37	5 26
13	M		5 13	6 49	8 45	5 56
14	Tu		5 11	6 51	9 49	6 29
15	W		5 9	6 52	10 48	7 6
16	Th		5 7	6 54	11 40	7 48
17	F	Fargier's Carbon Process pat 1861	5 5	6 56	Morn	8 34
18	S	[la Rue d. 1889	5 3	6 58	0 26	9 26
19	S	Low Sunday (9.30 A. Warren d.	5 0	6 59	1 6	10 22
20	M		4 58	7 1	1 41	11 21
21	Tu	Talbot's Photo.-etch. Proc. pat. 1858	4 56	7 2	2 11	After
22	W		4 54	7 4	2 38	1 26
23	Th		4 52	7 6	3 4	2 32
24	F	Celsius d. 1744	4 50	7 8	3 29	3 40
25	S	"Sun-blinds" pat. 1862	4 48	7 9	3 54	4 51
26	S	2nd Sunday after Easter Adam	4 46	7 11	4 20	6 3
27	M	● 1.31 A. [Salomon d. 1881	4 44	7 12	4 50	7 16
28	Tu	M. Carey Lea d. 1897	4 42	7 14	5 24	8 29
29	W		4 40	7 16	6 4	9 40
30	Th	Colonel Stuart Wortley d. 1890	4 33	7 18	6 53	10 43

BLAIR FILMS AND PLATES

PURE WHITE PAPER against face of Film, no harm. INNOCUOUS
PERFORATED NUMBERS

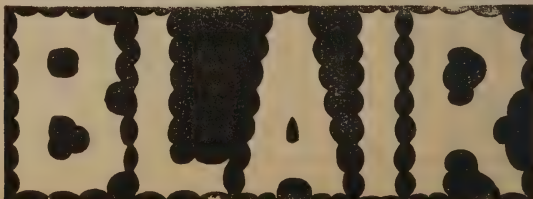
(See next page.)

The 'LONDON' INSTANTANEOUS

Is a plate of medium rapidity, possessing advantages in latitude and brilliancy generally attributable to slow plates alone. It is fast enough for slow shutter exposures, and where time exposures are permissible yields negatives unexcelled for use with any printing surface.

M A Y .

D. M.	D. W.	REMARKABLE EVENTS.	SUN.			MOON.	
			Rises.	Sets.		Rises.	Sets.
			H. M.	H. M.		Morn.	After.
1	F		4 36	7 19		7 50	11 39
2	S		4 35	7 21		8 56	Morn
3	S	3rd Sunday after Easter	4 33	7 22		10 7	0 25
4	M	Senebier b. 1742) 7.26 M.	4 31	7 24		11 20	1 4
5	Tu	J. W. Draper b. 1811	4 29	7 25		After	1 38
6	W	Humboldt d. 1859	4 27	7 27		1 47	2 7
7	Th		4 25	7 28		3 0	2 34
8	F	Peroxide of H. rec. for rem. of Hypo,	4 24	7 30		4 12	3 1
9	S	[1866, P. Meagher d. 1897	4 22	7 32		5 23	3 28
10	S	4th Sunday after Easter	4 20	7 34		6 31	3 56
11	M	Becquerel d. 1891 O 1.18 A.	4 18	7 35		7 36	4 26
12	Tu	Sir John Herschel d. 1871. W. B.	4 17	7 37		8 37	5 1
13	W	J. v. Liebig b. 1803 [Bolton d. 1899	4 15	7 38		9 32	5 42
14	Th	Fahrenheit b. 1686	4 14	7 40		10 21	6 27
15	F		4 12	7 41		11 4	7 17
16	S	Major C. Russell d. 1887	4 11	7 43		11 41	8 11
17	S	Rogation Sunday Association	4 9	7 44		Morn	9 8
18	M	[Belge founded, 1874	4 8	7 46		0 12	10 9
16	Tu	(3.18 A.	4 6	7 47		0 40	11 12
20	W		4 5	7 49		1 6	After
21	Th	Ascension Day. Scheele d. 1786	4 4	7 50		1 31	1 22
22	F		4 3	7 51		1 55	2 30
23	S	B. J. Sayce d. 1895	4 1	7 52		2 20	3 40
24	S	S. aft. Ascen.	4 0	7 54		2 48	4 52
25	M		3 59	7 55		3 19	6 6
26	Tu	● 10.50 A.	3 58	7 57		3 56	7 19
27	W		3 57	7 58		4 40	8 29
28	Th		3 56	7 59		5 35	9 30
29	F	Sir H. Davy d. 1829	3 55	8 0		6 41	10 23
30	S		3 54	8 2		7 52	11 6
31	S	Whitsunday	3 53	8 3		9 6	11 42



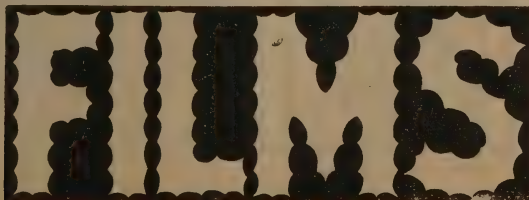
The 'LONDON' PLATES

ARE THE BEST

CLIMATE RESISTANTS.

JUNE.

D. M.	D. W.	REMARKABLE EVENTS.	SUN.				MOON.			
			Rises.	Sets.	H. M.	H. M.	Rises.	Sets.	Morn.	Morn.
1	M		3 52	8 4			10 22	Morn		
2	Tu	Niepce pub. his "Helio-) 1.24 A.	3 51	8 5			11 37	0 13		
3	W	[chromic Processes," 1851	3 50	8 6			After	0 41		
4	Th	Tessié du Mothay d. 1880	3 50	8 7			2 3	1 7		
5	F	George Mason d. 1901, aged 62	3 49	8 8			3 13	1 33		
6	S		3 48	8 9			4 21	2 0		
7	S	Trinity Sunday. Fraunhofer d. 1826	3 47	8 10			5 26	2 29		
8	M		3 47	8 11			6 28	3 2		
9	Tu	Alvan Clark d. 1897	3 46	8 12			7 25	3 39		
10	W	○ 3.8 M. [1853	3 46	8 13			8 17	4 21		
11	Th	Cutting's American Bromide pat.	3 46	8 13			9 2	5 9		
12	F		3 46	8 14			9 41	6 2		
13	S		3 45	8 14			10 14	6 58		
14	S	1st Sun. aft. Trin. Partnership be-	3 45	8 15			10 44	7 57		
15	M	[tween Daguerre and Niepce, 1837	3 45	8 15			11 10	8 59		
16	Tu	Chrysotype and Cyanotype Pro.	3 45	8 16			11 35	10 2		
17	W	[com. to Royal Soc., 1842	3 44	8 16			11 58	11 7		
18	Th	☾ 6.44 M.	3 44	8 17			Morn	After		
19	F	Abbé Laborde d. 1883	3 44	8 17			0 22	1 21		
20	S		3 44	8 18			0 48	2 30		
21	S	2nd Sun. aft. Trin. Niepce Memo-	3 44	8 18			1 17	3 42		
22	M	rial uncov. at Chalons, 1885	3 44	8 18			1 50	4 55		
23	Tu		3 45	8 18			2 30	6 6		
24	W	Hardwich d. 1890	3 45	8 19			3 20	7 12		
25	Th	● 6.11 M. [b. 1839	3 45	8 19			4 20	8 11		
26	F	W. B. Woodbury b. 1834. Liesegang	3 45	8 19			5 29	9 0		
27	S	Herr Wothly d. 1873. G. Price d. 1870	3 46	8 19			6 45	9 41		
28	S	3rd Sun. aft. Trin.	3 46	8 19			8 4	10 15		
29	M	Ferroso-oxalate Developer pub. 1877	3 47	8 18			9 22	10 45		
30	Tu		3 47	8 18			10 38	11 12		



Messrs. WRATTEN & WAINWRIGHT

Give special attention to the cutting and coating of plates for use in miniature and sheath cameras. With first orders it is advisable to send a sheath, or indicate the camera for which the plates are intended. All sizes are registered for future reference.

JULY.

D. M.	D. W.	REMARKABLE EVENTS.	SUN.		MOON.	
			Rises. H. M.	Sets. H. M.	Rises. Morn.	Sets. After.
1	W		3 48	8 18	11 52	11 38
2	Th		3 49	8 18	After	Morn
3	F		3 50	8 18	2 12	0 5
4	S	[Niepce d. 1833	3 50	8 17	3 18	0 33
5	S	4th Sun. aft. Trin. Nicephore	3 51	8 17	4 21	1 5
6	M	W. I. Stillman d. 1901, aged 74	3 52	8 16	5 20	1 40
7	Tu		3 53	8 16	6 14	2 20
8	W		3 54	8 15	7 1	3 6
9	Th	○ 5.43 A.	3 55	8 15	7 42	3 57
10	F	Daguerre d. 1851	3 56	8 14	8 17	4 52
11	S	[1730, G. Dawson d. 1897	3 57	8 13	8 48	5 50
12	S	5th Sun. after Trin. Wedgwood b.	3 58	8 12	9 15	6 51
13	M	Abbé Moigno d. 1884	3 59	8 11	9 40	7 53
14	Tu	Dumas b. 1800	4 0	8 10	10 4	8 56
15	W		4 1	8 9	10 27	10 0
16	Th	Claudet b. 1797	4 2	8 8	10 51	11 6
17	F	☾ 7.24 A. [1872	4 3	8 7	11 18	After
18	S	V. M. Griswold (Inv. Ferrotype) d	4 4	8 6	11 49	1 22
19	S	6th Sun. aft. Trin.	4 6	8 5	Morn	2 33
20	M	Collodion Pos. Process pub. 1852	4 7	8 4	0 24	3 43
21	Tu	Regnault b. 1810	4 8	8 3	1 7	4 51
22	W		4 9	8 2	2 0	5 54
23	Th		4 11	8 0	3 4	6 48
24	F	Sir William Abney b. 1843 ● 0.46 A.	4 12	7 59	4 16	7 33
25	S		4 14	7 58	5 35	8 11
26	S	7th Sun. aft Trin. Niepce de St.	4 15	7 56	6 56	8 45
27	M	[Victor b. 1806	4 16	7 55	8 16	9 15
28	Tu		4 17	7 53	9 34	9 43
29	W	Secchi b. 1818	4 19	7 52	10 48	10 10
30	Th		4 20	7 51	11 59	10 38
31	F	Wobler b. 1800 ☾ 7.15 M.	4 22	7 50	After	11 8

BLAIR FILMS AND PLATES

PURE WHITE PAPER against face of Film, no harm.
PERFORATED NUMBERS.

INNOCUOUS

[See next pag

Twenty-five years' continuous manufacture.

WRATTEN'S 'LONDON' PLATES.

LISTS FREE.

WRATTEN & WAINWRIGHT, CROYDON.

AUGUST.

D. M.	D. W.	REMARKABLE EVENTS.	SUN.			MOON.		
			Rises. H. M.	Sets. H. M.		Rises. After.	Sets. After.	
1	S		4 24	7 48		12 13	11 42	
2	S	8th Sun. aft. Trin.	4 25	7 46		3 14	Morn	
3	M	Mungo Ponton d. 1880	4 27	7 45		4 9	0 21	
4	Tu		4 28	7 43		4 58	1 4	
5	W	Wollaston b. 1766. W. K. Burton	4 30	7 41		5 40	1 53	
6	Th	[d. 1899]	4 31	7 39		6 18	2 46	
7	F	Berzelius d. 1848	4 33	7 38		6 51	3 43	
8	S	Roger Fenton d. 1869 O 8.54 M.	4 34	7 36		7 20	4 43	
9	S	9th Sun. aft. Trin.	4 36	7 34		7 46	5 45	
10	M	W. H. Harrison d. 1897	4 37	7 32		8 10	6 48	
11	Tu		4 39	7 30		8 34	7 52	
12	W		4 41	7 28		8 58	8 57	
13	Th	Prof. Stokes b. 1819	4 43	7 27		9 23	10 3	
14	F	Daguerreotype Process pat. 1839	4 44	7 25		9 51	11 10	
15	S		4 45	7 23		10 23	After	
16	S	10th Sun. aft. Trin. (5.22 M. Lavo-	4 46	7 21		11 2	1 26	
17	M	sier b. 1743	4 48	7 19		11 48	2 33	
18	Tu	Dr. Woodward (photo-microscopist)	4 49	7 17		Morn	3 36	
19	W	[d. 1884]	4 51	7 15		0 46	4 33	
20	Th		4 53	7 13		1 52	5 22	
21	F	Chevreur b. 1786	4 55	7 11		3 6	6 5	
22	S	● 7.51 A.	4 56	7 9		4 26	6 41	
23	S	11th Sun. after Trin.	4 58	7 7		5 47	7 12	
24	M	Cutting (Introd. of Ambrotype) d.	4 59	7 4		7 7	7 41	
25	Tu	Faraday d. 1867 [1867]	5 1	7 2		8 24	8 10	
26	W	Paul Pre sch d. 1873. Daguerre	5 2	7 0		9 39	8 39	
27	Th	[Mem. uncovered, 1883]	5 4	6 58		10 52	9 10	
28	F		5 5	6 56		After	9 44	
29	S	) 8.34 A.	5 7	6 54		1 4	10 21	
30	S	12th Sun. aft. Trin. Oliver Sarony	5 9	6 51		2 2	11 2	
31	M	Helmholtz b. 1821 [1879]	5 11	6 49		2 53	11 49	

BLAIR NEGATIVE BLAIR POSITIVE

THE STANDARD CINEMATGRAPH FILM. Used by the leading operators everywhere. [See next page.

THE 'LONDON' SPEED PLATES

Are most suitable for the shortest exposures in studio and field, and are well recommended for use where artificial lighting is adopted.

SEPTEMBER.

D. M.	D. W.	REMARKABLE EVENTS.	SUN.		MOON.	
			Rises. H. M.	Sets. H. M.	Rises. After.	Sets. Morn.
1	Tu	Norris's Dry-plate Process pat 1856	5 12	6 47	3 38	Morn
2	W		5 13	6 45	4 18	0 41
3	Th		5 15	6 43	4 53	1 36
4	F	Woodbury d. 1885	5 17	6 40	5 23	2 35
5	S	Pantascopic Camera patented, 1862	5 19	6 38	5 50	3 36
6	S	13th Sun. aft. Trin.	5 20	6 36	6 15	4 39
7	M	Poitevin Mem. inaug., 1885 O 0.20 M.	5 22	6 34	6 39	5 43
8	Tu	Gel.-bro. Proc. pub. by Maddox, 1871	5 23	6 31	7 3	6 48
9	W	Col.-bro. Proc. pub. 1864	5 25	6 29	7 28	7 54
10	Th		5 26	6 27	7 56	9 1
11	F		5 28	6 25	8 27	10 9
12	S		5 29	6 22	9 3	11 17
13	S	14th Sun. aft. Trin.	5 31	6 20	9 46	After
14	M	Humboldt b. 1769 (1.14 A.	5 33	6 18	10 37	1 26
15	Tu	Petzval d. 1891	5 35	6 16	11 36	2 23
16	W		5 36	6 13	Morn	3 14
17	Th	Fox Talbot d. 1877	5 38	6 11	0 44	3 58
18	F	Leon Foucault b. 1819	5 39	6 9	2 0	4 35
19	S	T. Grubb d. 1878 [of Develop. 1840	5 41	6 7	3 18	5 8
20	S	15th Sun. aft. Trin. Talbot's Disc.	5 42	6 4	4 37	5 39
21	M	Stas b. 1813 ● 4.31 M.	5 44	6 2	5 56	6 8
22	Tu	Faraday b. 1791. Thos. Sutton b.	5 45	5 59	7 14	6 37
23	W	Woodbury Pro. pat. 1864 [1819	5 47	5 57	8 30	7 8
24	Th		5 49	5 55	9 41	7 40
25	F	Dr. Van Monckhoven b. 1834, d. 1882	5 51	5 53	10 48	8 16
26	S		5 52	5 50	11 49	8 57
27	S	16th Sun. aft. Trin. Kolbe b. 1818	5 54	5 48	After	9 43
28	M	) 1.9 A.	5 55	5 46	1 33	10 34
29	Tu		5 57	5 44	2 16	11 28
30	W	Balard (Discoverer of Bromine) b. [1802	5 58	5 41	2 51	Morn

USE BLAIR LANTERN PLATES

FOR THE MOST
SUCCESSFUL RESULTS.

"SPECIAL" (Black Tones) and "RAPID CHLORIDE."

The EUROPEAN BLAIR CAMERA CO., Ltd., Foots Cray, KENT.

Send for Price List of all Films and Plates. [See last 5 pages.

WRATTEN'S 'LONDON' PLATES

Are ordered by the leading Governments for all Photographic work in the Tropics.

OCTOBER.

D. M.	D. W.	REMARKABLE EVENTS.	SUN.			MOON.		
			Rises.	Sets.	H. M.	Rises.	Sets.	After. Morn.
1	Th	Arago d. 1853	6	0	5 38	3	23	0 25
2	F		6	2	5 36	3	52	1 25
3	S		6	4	5 34	4	18	2 28
4	S	17th Sun. aft. Trin.	6	5	5 32	4	43	3 32
5	M		6	7	5 30	5	7	4 37
6	Tu		6	8	5 27	5	32	5 43
7	W	Leon Warnerke d. 1900	6	10	5 25	5	59	6 50
8	Th		6	12	5 23	6	29	7 59
9	F		6	14	5 20	7	3	9 8
10	S	18th Sun. aft. Trin.	6	15	5 18	7	44	10 16
11	S		6	17	5 16	8	33	11 21
12	M		6	18	5 14	9	30	After
13	Tu	(7.56 A.	6	20	5 12	10	34	1 12
14	W		6	22	5 10	11	45	1 56
15	Th		6	24	5 8	Morn		2 33
16	F	[1887	6	25	5 5	1	0	3 7
17	S		6	27	5 3	2	17	3 38
18	S		6	29	5 1	3	33	4 7
19	M	[1799. Wheatstone d. 1875	6	31	4 59	4	49	4 36
20	Tu		6	32	4 57	6	4	5 5
21	W		6	34	4 55	7	18	5 36
22	Th	● 3.30 A.	6	36	4 53	8	29	6 11
23	F		6	38	4 51	9	34	6 50
24	S		6	39	4 49	10	33	7 34
25	S	20th Sun. aft. Trin. Vernon Heath	6	41	4 47	11	26	8 22
26	M		6	43	4 45	After		9 16
27	Tu		6	45	4 43	0	51	10 13
28	W	[cess pub. 1864	6	46	4 41	1	24	11 13
29	Th		6	48	4 39	1	53	Morn
30	F		6	50	4 37	2	20	0 14
31	S	Talbot Photo-eng. Process pat. 1852	6	52	4 35	2	45	1 16

GOLD, SILVER OR PLATINUM

WASTE

BOUGHT BY

THE...

Sheffield Smelting Company, Ltd.

SHEFFIELD.

WE BACK THE ..

'LONDON' PLATES

to order only. A Special Department has been constructed, and is devoted exclusively to backing plates, thus minimising delay. Backing will not be found necessary except when working under specially difficult and peculiar conditions, the 'LONDON' Plates being, as ever, thickly coated.

NOVEMBER.

D. M.	D. W.	REMARKABLE EVENTS.	SUN.		MOON.	
			Rises.	Sets.	Rises.	Sets.
			H. M.	H. M.	After.	Morn.
1	S	21st Sun. after Trin.	6 53	4 33	3 9	2 20
2	M		6 55	4 31	3 33	3 26
3	Tu		6 57	4 30	3 59	4 34
4	W		6 59	4 28	4 28	5 43
5	Th	○ 5.28 M.	7 1	4 26	5 1	6 53
6	F	Senefelder b. 1771	7 2	4 24	5 40	8 4
7	S	Dubois Raymond b. 1818 [1895	7 4	4 23	6 27	9 13
8	S	22nd Sun. aft. Trin. J. P. Taylor d.	7 6	4 21	7 23	10 15
9	M	Pretsch's Pho.-eng. Pro. pat. 1854	7 8	4 20	8 26	11 10
10	Tu	Laroche d. 1886	7 9	4 18	9 35	11 57
11	W	Wilis's Aniline Process pat. 1864	7 11	4 17	10 49	Aft-r
12	Th	2.46 M.	7 13	4 15	Morn	1 11
13	F		7 15	4 14	0 4	1 41
14	S		7 16	4 12	1 19	2 9
15	S	3rd Sun. aft. Trin.	7 18	4 10	2 34	2 37
16	M	Lavater d. 1741	7 20	4 9	3 47	3 5
17	Tu		7 22	4 8	4 59	3 34
18	W	Daguerre b. 1787	7 23	4 6	6 10	4 6
19	Th	5.10 M.	7 25	4 5	7 17	4 43
20	F	Prof. Draper d. 1882	7 26	4 4	8 20	5 25
21	S	[1749	7 28	4 3	9 17	6 12
22	S	24th Sun. aft. Trin. Schlippe b.	7 30	4 1	10 6	7 4
23	M	Harrison (Inv. of Globe Lens) d.	7 32	4 0	10 48	8 0
24	Tu	[1864	7 33	3 59	11 24	8 59
25	W		7 35	3 58	11 55	10 0
26	Th		7 36	3 57	After	11 2
27	F	Celsius b. 1701 5.37 M.	7 38	3 56	0 48	Morn
28	S	Sutton Panoramic Camera pat. 1859	7 39	3 55	1 11	0 5
29	S	1st Sun. in Advent	7 41	3 55	1 35	1 9
30	M		7 42	3 54	2 0	2 14

PHOTOGRAPHIC RESIDUES.

purchased by

The Sheffield Smelting Co., Ltd., Sheffield.
SWEEP SMELTERS, GOLD, SILVER, AND PLATINUM
REFINERS, AND BULLION DEALERS.

WRATTEN'S 'LONDON' PLATES.

INSIST upon having the
GENUINE 'LONDON' PLATES.

If your Dealer does not
stock them, write direct to
the Makers

DECEMBER.

D. M.	D. W.	REMARKABLE EVENTS.	SUN.		MOON.	
			Rises.	Sets.	Rises.	Sets.
			H. M.	H. M.	After.	Morn.
1	Tu	Klaproth b. 1743	7 44	3 53	2 27	3 22
2	W		7 45	3 52	2 57	4 32
3	Th	[d. 1896	7 47	3 52	3 33	5 44
4	F	Galvani d. 1798. O 6.13 A. R. Kennel	7 48	3 51	4 17	6 54
5	S		7 50	3 51	5 10	8 0
6	S	2nd Sun. in Advent O'ernetter's	7 51	3 50	6 13	9 1
7	M	[Chro no-photo pat. 1864	7 52	3 50	7 23	9 54
8	Tu		7 53	3 50	8 37	10 38
9	W	Scheele b. 1742. Duc de Luynes d.	7 55	3 50	9 53	11 15
10	Th	[1867	7 56	3 49	11 8	11 46
11	F	Sir D. Brewster b. 1781 (10.53 M.	7 57	3 49	Morn	After
12	S	Rev. J. B. Reade d. 1870	7 58	3 49	0 23	0 42
13	S	3rd Sun. in Advent First Photo	7 59	3 49	1 37	1 9
14	M	[e am. Proc. pat. 1854	8 0	3 49	2 49	1 38
15	Tu		8 1	3 49	3 59	2 8
16	W	H. Greenwood d. 1884. T. Ross d.	8 2	3 49	5 6	2 42
17	Tu	Sir Humphry Davy b. 1778 [1870	8 3	3 49	6 9	3 21
18	F	9.26 A.	8 3	3 49	7 8	4 5
19	S	Dr. H. W. Vogel d. 1898-	8 4	3 49	8 0	4 55
20	S	4th Sun. in Advent	8 4	3 50	8 45	5 49
21	M		8 5	3 50	9 24	6 47
22	Tu	Wollaston d. 1828	8 5	3 51	9 57	7 47
23	W		8 6	3 51	10 26	8 49
24	Th		8 6	3 52	10 52	9 51
25	F	Christmas Day. Sir I. Newton b.	8 7	3 52	11 16	10 54
26	S	[1642	8 7	3 53	11 39	11 58
27	S	Sunday after Christmas) 2.23 M.	8 8	3 54	After	Morn
28	M	J. T. Goddard d. 1866	8 8	3 55	0 27	1 3
29	Tu		8 8	3 55	0 55	2 10
30	W	J. H. Dallmeyer d. 1883	8 8	3 56	1 27	3 19
31	Th	A. B. aun d. 1877	8 8	3 57	2 6	4 28

GOLD, SILVER OR PLATINUM

WASTE

BOUGHT BY

THE ..

Sheffield Smelting Company, Ltd.

SHEFFIELD.

Price List of Some of the NEW WIZARDS.



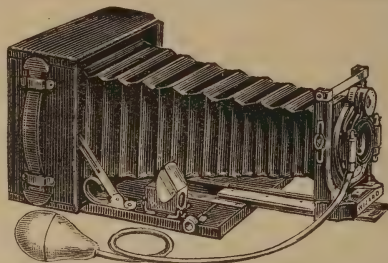
The Pocket Wizard, Mahogany, covered fine leather, $3\frac{1}{2} \times 5 \times 1\frac{3}{4}$ closed, smallest in the world for $\frac{1}{4}$ -plates. A unique camera for general use. Fine R.R. lens and shutter. Price (includes camera and a double slide) **38/6**. If with rack and pinion attachment, **45/-**

WIZARDS (89 & 90), something like the Pocket Wizard, but slightly heavier made. For $\frac{1}{4}$ -plates.

No. 89 with finest achromatic lens and shutter and one double slide, **35/-**.

No. 90, Rapid Rectilinear lens and one double slide, **46/-** (Cases extra **6/6**, fine leather, velvet lined).

The Magazine Wizard for 12 quarter-plates, **21/-** Shutter for time bulb and instantaneous (various times), with pneumatic release. Cheapest and smallest $\frac{1}{4}$ -plate Magazine ever offered to the public. It will pay you to see this before buying other Magazines.



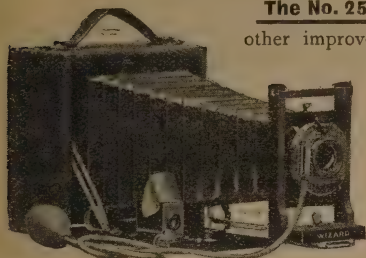
The Long Focus Wizard, $\frac{1}{4}$ -plate, No. 91, with finest R.R. lens (can use back lens for long focus), bellows long extension. Wonderful value; nothing equal to it of its class. Complete with fine leather case and 1 d.-d. slide, **63/-**

The Long Focus Wizard, 5×4 size, No. 93, exactly same as No. 91, price **66/-**

Extra slides, $\frac{1}{4}$ -plate **3/6**, and 5×4 size **4/6**.

Wizards 92 and 94, with reversible back and other improvements, fine R.R. lens and shutter, splendid cameras for regular ordinary work. Prices, complete camera, case and 3 slides, in 5×4 size, **3 guineas**; in half-plate size, **4 guineas**.

WIZARDS.



The No. 25 Wizard, with reversible back and other improvements. Bellows, (4 × 5 size) 11 inches; ($\frac{1}{2}$ -plate), 15 inches. Fine R.R. lens. Back lens can be used for long distance work. A very cheap and complete camera. Case and three holders. 5 × 4 size, 77/6; half-plate size, £5 10s.

The New Long 'Focus' Wizard, for advanced amateurs, superior to any of the foregoing. Has patent swing and reversible backs, automatic shutter, and finest lenses. Price, complete with case and three slides, 5 × 4, £5 15s.; half-plate size, £7 7s.



The New Long Focus Wizard Sr., with triple telescopic bed, rigid and strong, with every possible adjustment. The finest camera offered in the world for the same money. Complete with fine case and three slides, 5 × 4 size, £7 15s. $\frac{1}{2}$ -pl. „ £10 10s.

The Wizard Half-Plate and Stereo combined. **Two 5 × 4 pictures.** A remarkable camera. Send for full description. £12 12s.

The Wizard Compactum, a mahogany, highly-polished camera (not covered leather) for professionals and advanced amateurs. Strongest, most elegant, and cheapest on the market. Beautifully made. Price, whole plate camera and one slide and canvas case (without lens and shutter), £7 7s. Ditto, 8 × 10 size, £8 8s.

SEND FOR ART CATALOGUE.

SEABROOK BROS. & CO.

21, Edmund Place, London, E.C.

PURE PHOTOGRAPHIC CHEMICALS.



CHLORO-PLATINITE of POTASH (Harrington's).

In 15-grain tubes, or in bulk. The acknowledged Standard make.

GOLD CHLORIDE (Harrington's).

In 15-grain tubes, or in bulk. Guaranteed *full weight and strength*

SULPHOCYANIDE OF AMMONIUM.

Our make has had the highest reputation of many years.

PYROGALLIC ACID. H.B.L. Brand.

Thoroughly reliable, and in extensive use.

SULPHITE OF SODA.

CRYSTAL and DRY CARBONATE OF SODA.

HYPOSULPHITE OF SODA.

Ordinary, or pea Crystal. In bulk, or in 1-lb. Boxes or Canisters.

**OXALATE, CARBONATE, and
PHOSPHATE OF POTASH.**

PHOTOGRAPHIC CHEMICALS of every kind.

Either in bulk or in Bottles of all sizes.

Special Terms for the latter, with Customers' Names on labels.

CHEMICALS for PROCESS WORK of every description.

PRICE LISTS ON APPLICATION.

HARRINGTON BROS.,
4, OLIVER'S YARD, CITY ROAD, LONDON, E.C.

Manufacturers of

Fine Chemicals for Laboratory, Technical, and Research
Work.

Telegrams :—"SICCATIVE, LONDON."

BARNET PLATES.

CUT FILMS &

INDEX.

Speeds and Qualifications of Barnet Plates	600
Prices of Barnet Plates	601
Price List of Continental Sizes of Plates, Papers, Films	602
The Barnet Lantern Plate	603
Barnet Cut Films	604
Barnet Plates for the Tropics	605
Prices of Barnet Bromide Paper	606
Platino-Matt Bromide Paper	607
Snow and Pink Enamel Paper... ..	608
Barnet Gaslight Bromide Paper.	609
Barnet Card Bromide Paper	610
Prices of Barnet P.O.P.	611
Barnet Roll Film	612
Barnet Carbon Tissue	613
Barnet Enlargements	614

Postal: "ELLIOTT & SONS, Ltd.,
Barnet, Herts, England."

Telephone: "No. 11 Barnet."

Telegrams: "Elliott, Barnet."

PAPERS

CHARLES E. DAWSON

ELLIOTT & SONS LTD BARNET ENGLAND

Barnet Plates

Speeds and . .
Qualifications

* Approximate Speeds.		H. & D.	Wat- kins.	Wynn.
BARNET "ORDINARY."	For Field, general purposes, and Copying, and specially recommended to beginners; it is thickly coated and allows great latitude in exposure. Used in conjunction with our Exposure Cards (one of which is enclosed with each box), wrong exposure is almost impossible.	50	64	f 64
BARNET "MEDIUM."	For Field or Studio Work. This Brand combines the advantages of good average speed, with superlative quality. We can confidently recommend it as the most perfect all-round Plate. When in doubt as to what plate to use, the Barnet "Medium" can be adopted with certainty of success.	100	128	f 90
BARNET "EXTRA RAPID."	For Studio and Landscape, and recommended to Hand Camerists; the most popular instantaneous plate. Made always up to speed. $\frac{1}{4}$ -plates accurately cut, and on thin glass.	200	256	f 128
BARNET "ROCKET."	The quickest plate made, and exceptionally fine in grain. It can be forced to any reasonable extent without fogging. Specially made for all classes of high speed shutter work. Thickly coated. $\frac{1}{4}$ -plates accurately cut from thin crystal glass.	250	300	f 156
BARNET "LANTERN."	A wide range of tones can be obtained, from black to warm red, by simple variation of exposure and development. Explicit instructions enclosed with each box.	NOTE. The Hurter & Driffield, Watkins or Wynn Speed Meters can be obtained through any Dealer of standing.		
BARNET "PHOTO-MECHANICAL."	Specially manufactured to suit the requirements of process workers in line and half tone.			

*** Important Notice.** It is well to note that the Speed Numbers we have given indicate the actual speeds attained with the use of our "Standard Developer," as being more practical for every-day use than the Standard Ferrous Oxylate Developer used for scientific measurements. Our speed numbers may of course be doubled by using the more powerful developers.

ELLIOTT & SONS, LTD., BARNET, HERTS, ENGLAND.

BARNET PLATES

Size.	PHOTO-MECHANICAL ORDINARY, MEDIUM, EXTRA RAPID, AND LANTERN		ROCKET.	Additional Price for Backing.
	PER DOZ.		PER DOZ.	
$1\frac{1}{4}$ by $1\frac{1}{4}$	... /6 (on Thin Glass /8) ...		/9	—
2 „ 2	... /6 („ /8) ...		/9	—
$2\frac{5}{16}$ „ $1\frac{3}{4}$	... /6 („ /8) ...		/10	—
$3\frac{1}{2}$ „ $2\frac{1}{2}$	... /9 („ /10) ...		1/0	—
$4\frac{1}{4}$ „ $3\frac{1}{4}$	... 1/0 ...		1/6	-/3
5 „ 4	... 1/7 ...		2/6	-/4
$6\frac{1}{2}$ „ $4\frac{1}{4}$	... 2/2 ...		3/3	-/6
$6\frac{1}{2}$ „ $4\frac{3}{4}$	... 2/3 ...		3/8	-/6
$7\frac{1}{4}$ „ $4\frac{1}{2}$	... 2/10 ...		4/6	-/6
$7\frac{1}{2}$ „ 5	... 3/5 ...		5/3	-/9
$8\frac{1}{2}$ „ $6\frac{1}{2}$	... 4/3 ...		6/6	-/9
9 „ 7	... 5/0 ...		8/0	-/9
10 „ 8	... 7/3 ...		10/6	1/0
13 „ 8	... 10/0 ...		15/0	1/3
12 „ 10	... 10/6 ...		16/0	1/6
15 „ 12	... 18/0 ...		28/0	2/0
18 „ 16	... 32/6 ...		50/0	3/0
24 „ 18	... 51/0 ...		76/6	—
24 „ 20	... 60/0 ...		90/0	—

Other sizes made to order. $8\frac{1}{2} \times 6\frac{1}{2}$ are packed in half-dozens to order at 6d. per dozen extra. 10×8 and upwards are packed in half-dozens without extra charge.

All Plates for Export are specially prepared and packed.

Price List of Continental Sizes see page 602.

BARNET BOOK OF PHOTOGRAPHY.

6th Edition. 285 pages. Illustrated, 1/-



ELLIOTT & SONS, LTD.,

BARNET, HERTS, ENG.

*Prices of Plates,
Bromide Paper,
P.O.P., and Films.*

CONTINENTAL SIZES.

BARNET PLATES.

Centimetres.	All Plates except "Rocket."				"Rocket."	
4.5 × 6	..	/6	per doz.	(on Thin Glass, /8)	..	/10 per doz.
6.5 × 9	..	/9	"	"	..	1/0 "
9 × 12	..	1/4	"	"	..	2/0 "
12 × 16½	..	2/3	"	"	..	3/8 "
13 × 18	..	2/8	"	"	..	4/0 "
18 × 24	..	5/0	"	"	..	8/0 "

Other sizes in proportion.

BARNET BROMIDE PAPERS.

All Papers except Enamel Surface Papers.

Centimetres.	6 sheets.				12 sheets in packets	
9 × 12	—	..	/9
12 × 16½	—	..	1/0
13 × 18	—	..	1/4
18 × 24	1/4	..	2/6
24 × 30	2/3	..	4/2 in Tube or Pkt.
30 × 40	3/6	..	6/9 "

Other sizes in proportion.

NOTE.—When ordering please say if required flat or in roll.

BARNET P.O.P.

Centimetres.								
9 × 12	..	..	..	..	..	..	24 pieces	/10
12 × 16½	..	..	..	..	..	..	15 "	/10
13 × 18	..	..	..	..	..	..	12 "	/10
18 × 24	..	..	..	..	..	..	7 "	/10

BARNET FILMS—Cut Sizes.

Centimetres.	"Ordinary" and "Extra Rapid"				"Rocket"	
9 × 12	2/0	per dozen	..	2/10 per dozen.
12 × 16½	3/8	"	..	4/6 "
13 × 18	4/0	"	..	5/3 "
18 × 24	8/0	"	..	10/0 "

AGENTS ALL OVER THE WORLD.

BARNET BOOK OF PHOTOGRAPHY.

50th Thousand.
Profusely Illustrated.

1/- Postage - 4d
Foreign do. 7d.

ELLIOTT & SONS, LTD., BARNET, HERTS, ENGLAND.

BARNET 1/- PER DOZ.

= Lantern Plate.



FOR WARM OR COLD TONES. Every Box contains full instructions for working and for the obtaining of a wide range of tones

Those who seek further instruction in Slide Making are referred to the highest authority on the subject, **Mr. ANDREW PRINGLE**, in his excellent article written expressly for us in

The Barnet Book of Photography. Price 1/-. Postage 4d.

SOLE MANUFACTURERS—

ELLIOTT & SONS, Ltd., Barnet, Herts, Eng.

BARNET

CUT FILMS

LESS
THAN
ONE
TENTH
THE
WEIGHT
OF
PLATES.

CHAS. E. DAWSON

*Specially recommended
to Cyclists and
Travellers, having the
advantage of being
Portable, Unbreakable,
and Absolutely Reliable.*

Size.	Ordinary and Extra Rapid.	Rocket.
4½ by 3½	1/6 per doz....	2/0 per doz.
5 " 4	2/6 "	3/0 "
6½ " 4½	3/8 "	4/6 "
8½ " 6½	6/6 "	8/0 "
10 " 8	10/6 "	12/0 "

Sole Manufacturers :

Other sizes on application.

ELLIOTT & SONS, Ltd., Barnet, Herts.

BARNET PLATES

ARE SPECIALLY PREPARED & PACKED FOR
THE TROPICS
& CAN BE DEVELOPED & WASHED IN HIGH TEMPERATURES WITHOUT FRILLING



ELLIOTT & SONS L^D BARNET
ENGLAND

BARNET**PLATINO-MATT
AND ORDINARY.****Bromide Paper.**

PLATINO-MATT	Smooth	} Uniform Price.
Do.	do.	...	Rough	
Do.	do.	...	Cream Crayon	
ORDINARY	ENLARGING	...	Rough	
Do.	do.	...	Smooth	

2 $\frac{5}{16}$ by 1 $\frac{3}{4}$...	24 sheets	6d.	3 $\frac{1}{2}$ by 2 $\frac{1}{2}$...	16 sheets	6d.
2 $\frac{1}{4}$ " 2 $\frac{1}{4}$...	24 "	6d.	4 $\frac{1}{2}$ " 2 $\frac{3}{4}$...	12 "	6d.
2 $\frac{1}{2}$ " 2 $\frac{1}{2}$...	24 "	6d.	3 $\frac{1}{2}$ " 3 $\frac{1}{2}$...	12 "	6d.

6 SHEETS.	12 SHEETS in Packet.
------------------	-----------------------------

				s.	d.					
4 $\frac{1}{4}$ "	3 $\frac{1}{4}$ "	...	...	—	...	0	6	...	...	...
5 "	4 "	...	...	—	...	0	9	...	...	...
6 $\frac{1}{2}$ "	4 $\frac{3}{4}$ "	...	...	—	...	1	0	...	...	...
7 $\frac{1}{2}$ "	5 "	...	...	—	...	1	3	...	...	...
8 $\frac{1}{2}$ "	6 $\frac{1}{2}$ "	...	...	—	...	2	0	...	...	...
10 "	8 "	...	...	—	...	2	9	in Tube or Packet.		
12 "	10 "	...	...	2	2	4	2	"	"	"
12 $\frac{1}{2}$ "	10 $\frac{1}{2}$ "	...	...	2	4	4	6	"	"	"
15 "	12 "	...	...	3	3	6	3	"	"	"
15 $\frac{1}{2}$ "	12 $\frac{1}{2}$ "	...	...	3	6	6	9	"	"	"
18 "	15 "	...	...	5	0	9	6	"	"	"
23 "	17 "	...	...	6	9	12	6	"	"	"
25 "	21 "	...	...	9	6	18	0	"	"	"
30 "	25 "	...	...	13	6	26	0	"	"	"

NOTE.—When ordering please say if required flat or in roll.

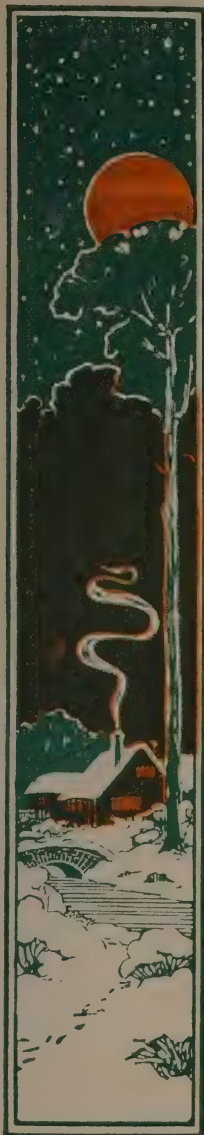
ROLLS.

					s.	d.
Rolls of 10 feet, 24 $\frac{1}{2}$ inches wide	...	...	...	...	8	6
" 25 " 40 " "	...	...	...	...	35	0
" 25 " 25 " "	...	...	...	...	22	0
Gross Boxes of Cabinet ...	...	...	...	...	10	0

Rolls of any width up to 40 inches cut to order.

THE CREAM CRAYON specially lends itself to Sepia Toning. Formula with every packet.

*Barnet Book of Photography, wonderful value, 1/-.***ELLIOTT & SONS, Ltd. Barnet, Herts, England.**



In the
Long Winter
Evenings,

*And at all other
Seasons of the Year,*

MAKE CONTACT
PRINTS ON

Barnet

BROMIDE
PLATINO-MATT
Papers.

ELLIOTT & SONS, LTD.,
Barnet, Herts, England.

BARNET SNOW ENAMEL & PINK ENAMEL BROMIDE PAPER.

These Bromide Papers have a highly Enamelled Surface, giving a purity of effect, and a minute rendering of detail, so essential in many classes of work. Prints can be made and finished by this process in a few hours. Manipulated in same way as Platino-Matt.

PACKETS OR TUBES.	4 $\frac{1}{4}$	by	3 $\frac{1}{4}$	...	...	12 sheets	...	0/8
	5	"	4	...	...	12 "	...	1/0
	5 $\frac{3}{4}$	"	4	...	...	12 "	...	1/3
	6	"	4 $\frac{1}{4}$	...	...	12 "	...	1/3
	6 $\frac{1}{2}$	"	4 $\frac{3}{4}$	...	...	12 "	...	1/6
	7 $\frac{1}{2}$	"	5	...	...	12 "	...	1/8
	8 $\frac{1}{2}$	"	6 $\frac{1}{2}$	...	...	12 "	...	2/6
	10	"	8	...	...	12 "	...	3/6
	12	"	10	...	...	12 "	...	5/0
	12 $\frac{1}{2}$	"	10 $\frac{1}{2}$	...	...	12 "	...	5/6
	15	"	12	for 6 sheets 3/6 for 12 sheets				7/0
	15 $\frac{1}{2}$	"	12 $\frac{1}{2}$	"	3/9	"	...	7/6
	23	"	17	"	7/0	"	...	14/0
	25	"	21	"	10/6	"	...	21/0
	30	"	25	"	14/3	"	...	28/6
	40	"	30	"	23/3	"	...	46/6



NOTE.—When ordering please say if required flat or in roll.

25-FEET	12 inches wide	...	...	...	...	11/10
	18 "	...	...	...	...	17/4
ROLLS.	25 "	...	...	...	...	24/4
	30 "	...	...	...	...	29/2

FOR WINTER WORK.—All the advantages of Bromide and P.O.P. are incorporated in Barnet Enamel Papers.

BARNET BOOK OF PHOTOGRAPHY (See Articles on CONTACT PRINTING and ENLARGING) 1/-

MANUFACTURED BY

ELLIOTT & SONS, Ltd., Barnet, Herts, England.



Glossy

and

Matt.



The . . .
Most Perfect Quality.

PRICES.

	s. d.		s. d.
2 $\frac{3}{4}$ by 1 $\frac{1}{2}$ —30 sheets	0 6	8 by 6—12 sheets	1 9
2 $\frac{1}{2}$ " 2 $\frac{1}{2}$ —20 "	0 6	8 $\frac{1}{2}$ " 6 $\frac{1}{2}$ —12 "	2 0
3 $\frac{1}{4}$ " 2 $\frac{1}{4}$ —34 "	1 0	10 " 8—12 "	2 9
3 $\frac{1}{2}$ " 3 $\frac{1}{4}$ —30 "	1 0	12 " 10—12 "	4 2
3 $\frac{3}{4}$ " 3 $\frac{3}{4}$ —28 "	1 0	12 $\frac{1}{2}$ " 10 $\frac{1}{2}$ —12 "	4 6
4 $\frac{1}{4}$ " 3 $\frac{1}{4}$ —24 "	1 0	15 " 12—12 "	6 3
5 " 4—18 "	1 0	15 $\frac{1}{2}$ " 12 $\frac{1}{2}$ —12 "	6 9
5 $\frac{3}{4}$ " 4—14 "	1 0	18 " 15—12 "	9 6
6 " 4 $\frac{1}{4}$ —14 "	1 0	23 " 17—12 "	12 6
6 $\frac{1}{2}$ " 4 $\frac{1}{2}$ —12 "	1 0	25 " 21—12 "	18 0
7 $\frac{1}{2}$ " 5—12 "	1 3		

25 FEET ROLLS.

	s. d.
15 inches wide	13 3
20 " " " " " "	17 6
22 " " " " " "	20 0
25 " " " " " "	22 0
30 " " " " " "	26 6
40 " " " " " "	35 0

BOXES.

	s. d.
1 gross (144 sheets) 5 $\frac{3}{4}$ by 4	10 0
$\frac{1}{2}$ gross (72 sheets)	5 0

ELLIOTT & SONS, Ltd., Barnet, Herts, England.

THE Barnet Card

PLATINO-MATT

Bromide Paper ..

Special attention is directed to this make. Besides possessing the charm of beautiful velvety blacks and pure whites, always associated with Barnet Platino-Matt Papers, it does not require Mounting, which is an additional advantage. The substance is that of a fine card and is specially adaptable for the making of

Xmas Cards

and such like.

PRICES:

4 $\frac{1}{4}$	by	3 $\frac{1}{4}$	..	..	12 sheets	..	-/9
5	"	4	..	..	12 "	..	1/0
5 $\frac{1}{2}$	"	3 $\frac{1}{2}$	..	..	12 "	..	1/0
5 $\frac{3}{4}$	"	4	..	..	12 "	..	1/6
6 $\frac{1}{2}$	"	4 $\frac{3}{4}$	..	..	12 "	..	1/6
7 $\frac{1}{2}$	"	5	..	..	12 "	..	2/0
8 $\frac{1}{2}$	"	6 $\frac{1}{2}$	..	..	12 "	..	3/0
10	"	8	..	..	12 "	..	4/0
12	by	10	..	12 sheets	..	6 sheets	..
12 $\frac{1}{2}$	"	10 $\frac{1}{2}$	..	12 "	..	6 "	..
15	"	12	..	12 "	..	6 "	..
15 $\frac{1}{2}$	"	12 $\frac{1}{2}$	..	12 "	..	6 "	..
18	"	15	..	12 "	..	6 "	..
23	"	17	..	12 "	..	6 "	..
					6/3		3/3
					6/9		3/6
					9/6		5/0
					10/0		5/6
					14/6		7/6
					19/0		10/0

Sole Manufacturers :

ELLIOTT & SONS, Ltd. Barnet, England.

BARNET P.O.P.

GLOSSY-
MAUVE.
PINK.
WHITE.
MATT-
WHITE.

PACKETS.



$2\frac{5}{16}$	by	$1\frac{3}{4}$	... 54 pieces	-/6 ...	...	...
$2\frac{1}{2}$	"	$2\frac{1}{2}$	... 36 "	-/6 ...	...	...
$3\frac{1}{2}$	"	$2\frac{1}{2}$	... 24 "	-/6 ...	57 pieces	1/0
$4\frac{1}{2}$	"	$2\frac{3}{4}$	... 18 "	-/6 ...	44 "	1/0
$3\frac{1}{4}$	"	$3\frac{1}{4}$	... 20 "	-/6 ...	47 "	1/0
$3\frac{1}{2}$	"	$3\frac{1}{2}$	... 18 "	-/6 ...	40 "	1/0
4	"	3	... 18 "	-/6 ...	42 "	1/0
$4\frac{1}{4}$	"	$3\frac{1}{4}$	... 16 "	-/6 ...	36 "	1/0
5	"	4	... 10 "	-/6 ...	24 "	1/0
6	"	$4\frac{1}{4}$	... ..	...	24 "	1/0
$6\frac{1}{2}$	"	$4\frac{3}{4}$	... ..	...	16 "	1/0
$7\frac{1}{2}$	"	5	... ..	...	12 "	1/0
$8\frac{1}{2}$	"	$6\frac{1}{2}$	... ..	...	9 "	1/0
10	"	8	... ..	...	12 "	2/0
12	"	10	... ..	...	12 "	3/0

TUBES.



Containing	2 Sheets	... $24\frac{1}{2}$ by 17	... 1/4
"	6 "	... $24\frac{1}{2}$ " 17	... 4/0
"	12 "	... $24\frac{1}{2}$ " 17	... 7/6
"	24 "	... $24\frac{1}{2}$ " 17	... 15/0
"	24 "	... 24 " 20	... 17/6

GROSS

BOXES.

Per Box containing	144 pieces	$3\frac{1}{2}$ by $2\frac{1}{4}$	... 1/8
"	"	" $3\frac{5}{8}$	" $2\frac{3}{8}$... 1/10
"	"	" $5\frac{1}{2}$	" 4 ... 4/8
"	"	" $5\frac{3}{4}$	" 4 ... 5/0
"	"	" 8	" 6 ... 10/6

Full instructions for working are enclosed.

THE BARNET BOOK OF PHOTOGRAPHY.

Illustrated.

Price 1/. Nett.

Postage 4d.

ELLIOTT & SONS, Ltd., Barnet, Herts, England.

THE LATEST AND BEST
INTRODUCTION.



READY for DELIVERY in JANUARY, 1903.

THE
BARNET

TRANSPARENT CELLULOID

*In all the
Popular Sizes,
and for all
Daylight Loading
Roll Film Cameras.*

ROLL
FILM.

PERFECT QUALITY.

EXTREMELY RAPID.

EASY OF DEVELOPMENT.

SOLE MANUFACTURERS,

ELLIOTT & SONS, Ltd., Barnet, Herts, England.

BARNET CARBON TISSUE.

STOCK COLOURS.

1 Red Chalk	8 Purple
2 Terra Cotta	9 Warm Black
3 Barnet Brown	10 Eng. Black
4 Sepia	11 Blue Black
5 Warm Sepia	12 Grey
6 Standard Brown	13 Marine Blue
7 Purple Brown	14 Sea Green

Sensitive or Insensitive Tissues.

Insensitive Tissues.

TISSUE.

	Doz.	Doz.	Doz.	Doz.	Doz.	Doz.	Doz.	PER BAND of 12ft. by 30in.	PER BAND of 6ft. by 30in.	PER BAND of 3ft. by 30in.
Carbon Tissue ..	0/5	0/8	0/10	1/6	2/0	3/0	4/0	6/6	3/6	2/0
Any colour.								ft. in. 12 x 24	ft. in. 6 x 24	ft. in. 3 x 24
Transparency Tissue ..	0/7	1/0	1/3	2/0	3/0	4/0	5/6	8/6	4/6	2/6
Black only										

* FINAL SUPPORTS.

For Single Transfer—

								BAND ft. in. 12 x 30		
Medium ..	0/2	0/3	0/4	0/8	1/0	1/6	2/0	2/9	..	..
Thick ..	0/2	0/3	0/4	0/8	1/0	1/6	2/0	3/0	..	..
Thin ..	0/3	0/4	0/5	0/10	1/4	2/0	2/8	3/6	..	..
Tinted Rives' ..	0/3	0/4	0/5	0/10	1/4	2/0	3/0	4/0	..	..
Toned Etching ..	0/3	0/4	0/5	0/10	1/4	2/0	2/8	3/9	..	..

Drawing Papers—

Whatman Hand-made (rough) ..

Joynson's ..	0/6	0/9	1/0	2/0	3/6	4/6	6/0	1/0		
Hollingsworth's ..	0/6	0/9	1/0	2/0	3/6	4/6	6/0	per sheet 30 by 22.		

For Double Transfer—

								BAND		
Medium ..	0/3	0/4	0/5	0/9	1/2	1/9	2/6	3/0	..	..
Thin ..	0/3	0/4	0/6	0/10	1/4	2/0	3/0	3/6	..	..
Tinted ..	0/3	0/4	0/6	0/10	1/4	2/0	3/0	4/0	..	..

* TEMPORARY SUPPORTS.

Flexible Temporary Supt.	0/7	0/9	1/0	1/8	2/4	3/3	4/6	..	..	..
Rigid Temporary Support (ground opal) ..	1/0	1/6	2/6	4/6	8/6	15/0	24/0	..	..	..

Waxing Solution, Collodion, Squeegees, Thermometers, Actinometers, Sets of Trays, &c., &c., stocked.

Sensitive Tissues are supplied—	Per band, 7/6.	Per ½ band, 4/0.	Per ¼ band, 2/6.
Sensitive Transparency Tissue—	9/6	5/0	3/0.

+ Half dozens supplied from 8½ by 6½ upwards if required, but below that size, dozs. only.

* NOTE.—Both Final and Temporary Supports are cut with a sufficient margin to admit of proper Transfer.

SAMPLE PACKET (half-plate) supplied post free against Cash remittance—

Containing 1 doz. assorted Tissue; 3 pieces Temporary Support; 3 pieces Single Transfer; 3 pieces Toned Etching Paper; 6 pieces Final support; and Pamphlet giving all Instructions...

Retouching Medium ... 6d. per bottle.

Barnet Book of Photography (Illustrated), 1/0; postage 4d.

ELLIOTT & SONS, Ltd.
Barnet, Herts,
England.

Enlargements

and Printing

In all Processes.

FOR THE TRADE ONLY.

EXPERTS

The Staff of ARTISTS employed are without exception the most CLEVER and SKILFUL in the PROFESSION, In OILS, WATER COLOUR, & BLACK & WHITE.

for 25 years in the
Production of
HIGH-CLASS

Carbon

And

Bromide

Work.

Orders from Colonies and Abroad receive special attention, and are quickly executed and are dispatched home by the mail succeeding that by which the order is received.

FULL PRICE LIST ON APPLICATION.

POST FREE.

ELLIOTT & SONS, Ltd., Barnet. Herts, England.

PHOTOGRAPHIC SOCIETIES

OF THE

UNITED KINGDOM.

Aberdare and District Photographic Society.—(ESTABLISHED 1901).—Meetings held at Memorial Hall Buildings. *President*—Dr. Iann G. Thomas. *Vice-Presidents*—D. A. Thomas, M.P., and Rev. J. S. Longdon, M.A. *Committee*—Messrs. I. Wallis Dodgson, B.Sc. (Chairman), L. H. Miles, Martin Palmer, J. E. Thomas, W. Greaves, Walker, Davies, and B. I. Thomas. *Treasurer*—A. S. Morris, "Cartref." *Secretary*—Geo. Jenkins, 8 Stuart Street, Aberdare.

Aberdeen Association of Professional Photographers.—*President*—James Ewing. *Vice-President*—G. W. Morgan. *Committee*—W. B. Anderson, W. L. Dunn, F. W. Hardie, W. Lawson, J. T. Pithie. *Hon. Treasurer*—John McMahon. *Hon. Secretary*—J. S. Greenacre, 101 Rosemount Place.

Aberdeen Photographic Association.—(ESTABLISHED 1891.)—Meetings held at the Rooms, 10 Belmont Street. *Hon. Presidents*—James Main and Alex. Pender. *President*—James S. Anderson. *Vice-Presidents*—G. R. Ford, G. Robertson, W. Tennent. *Committee*—E. Clark, W. Campbell, J. A. T. Garrioch, G. H. Henderson, A. I. Mortimer, J. D. W. Stewart, P. Wilkie. *Lanternist*—W. T. Borthwick. *Treasurer*—James Dunn. *Secretary*—Charles E. Campbell, 9 Diamond Street, Aberdeen.

Accrington and District Camera Club.—(ESTABLISHED 1892.)—*President*—Dr. Clayton. *Vice-Presidents*—A. Barnes, W. J. Cheney, W. Clayton, T. Stanley. *Committee*—J. Barnes, F. Bradshaw, A. Greenwood, J. A. Hanson, J. R. Hitchon, W. Kenyon. *Secretary and Treasurer*—Isaac Hanson, 341 Willows Lane, Accrington.

Affiliation of Photographic Societies with the Royal Photographic Society.—(ESTABLISHED 1892.)—*Chairman*—The Right Hon. the Earl of Crawford, K.T., F.R.S. *Executive Committee*—Robert Beckett, F.R.P.S. (Hackney), C. Churchill, F.R.P.S. (Woolwich), John F. East (Kingston-on-Thames), Walter Kilbey (N.W. London), A. Mackie (London and Provincial), E. Marriage, F.R.P.S. (Woodford), J. C. S. Mummery (North Middlesex), C. H. Oakden, F.R.P.S. (South London), H. C. Rapson (London and Provincial), W. R. Stretton (Photographic Club). *Hon. Treasurer*—George Scamell, F.R.P.S. *Auditors*—E. W. Bannister (Borough Polytechnic), and W. H. Wilshire (West Surrey). *Secretary*—A. W. W. Bartlett, 66 Russell Square, London, W.C.

J. LANCASTER & SON, Birmingham.

Over 320,000 Lancaster Cameras are in daily use
all over the Globe.

FOR PARTICULARS AND PRICES SEE PAGES 487 TO 550.

Aintree Photographic Society.—(ESTABLISHED 1893.)—Meetings held at the Aintree Institute, Aintree, Liverpool. *President*—William Lockier. *Vice-Presidents*—D. J. Neill and W. H. Lloyd. *Committee*—C. H. Adkins, F. Ackerley, T. Binnie, R. C. Herman, D. J. Kidd, D. Smith, D. Travis, R. Walker, W. H. Warburton, Dr. Dixon. *Treasurer*—John Harris. *Secretary*—J. Herbert Rigby, Elton, Aintree.

Aldenhall Institute Camera Club.—(ESTABLISHED ABOUT 1880.)—Meetings held at Aldenhall Institute, Goldington Crescent, St. Pancras, N.W. *Secretary*—D. J. F. Campbell, 15 Yerbury Road, Tufnell Park, London, N.

Altrincham Photographic Society.—(ESTABLISHED 1894.)—Meetings held at the Technical Schools, Altrincham. *President*—W. M. Blackshaw. *Vice-Presidents*—J. B. Stubbs and R. W. Martin. *Committee*—Messrs. Faulkner, H. Jones, A. Drinkwater, H. Short, T. Rowlands. *Treasurer*—Chas. Rutter. *Secretary*—J. A. Hill, Fernside, Hale, Cheshire.

Amateur Photographic Association of Great Britain.—(ESTABLISHED 1861, REORGANISED 1900.)—Offices: The London Stereoscopic Company, 106 Regent Street, W. *President*—His Royal Highness the Prince of Wales, K.G., K.T., &c. *Vice-Presidents*—His Royal Highness the Duke of Cambridge, K.G., His Grace the Archbishop of York, His Grace the Duke of Newcastle, the Right Hon. the Earl of Rosse, F.R.S., the Right Hon. the Earl of Warwick, General the Right Hon. the Lord De Ros, James Glaisher, F.R.S., F.R.A.S., &c. *Council*—The Right Hon. the Viscount Maitland, Major-General G. F. Kaye, Charles Stephens, Walter Wood, F.R.G.S., Robert O. Milne, Edward Kennard, M. J. Paterson, R. W. Kennard. *Hon. Secretary*—J. Lillie Mitchell.

Amateur Photographic Field Club.—(ESTABLISHED 1858.)—*President*—Tom Bright. *Hon. Treasurer*—Francis Cobb. *Hon. Secretary*—Viscount Maitland, 14 Lower Sloane Street, S.W.

Arbroath Amateur Photographic Association.—(ESTABLISHED 1890.)—Meetings held at the Y.M.C.A. Rooms. *President*—Robert Davidson. *Vice-Presidents*—Robert Moodie and Geo. G. Dalgarno. *Committee*—David Young, John Geddes, Geo. K. Reid, Andrew Scott, James Robertson, James S. Whyte. *Treasurer*—David D. Calder. *Secretary*—James Hood, 94 High Street, Arbroath.

Ashton-under-Lyne Photographic Society.—(ESTABLISHED 1891.)—Meetings held at the Society's Rooms, Henry Square, Ashton-under-Lyne. *President*—Dr. Alex. Hamilton. *Vice-Presidents*—Major Bradley, T. Cheyne, T. F. Kershaw, Charles Lord, W. C. Brown, T. Glazebrook, Walter Leigh, Samuel A. Platt. *Committee*—Walter Chadwick, Alfred Cooper, Harold Fielding, H. Hall, John Hall, William Hallam, John W. Kenworthy, Henry S. Miller. *Treasurer*—Robert T. Marsland. *Secretary*—Harry Williams, 127 Welbeck Street, Ashton-under-Lyne.

J. LANCASTER & SON, Birmingham.

Nearly Half a Million Lancaster Lenses are now
in use in every Country in the World.

FOR PARTICULARS AND PRICES SEE PAGES 487 TO 550.

Aston Photographic Society.—Meetings held at Burlington Hall, High Street, Aston. *President*—Harold Baker. *Vice-Presidents*—F. W. Pilditch and T. A. Sands. *Hon. Treasurer*—A. C. Townsend. *Hon. Secretary*—J. C. Taylor, West View, 9 Chain Walk, Lozells, Aston.

Attercliffe Photographic Society.—(ESTABLISHED 1897.)—Meetings held at Friends' Adult School, Leeds Road. *President*—J. Hudson Lygo. *Vice-Presidents*—J. G. Ellis, F. H. Barnsley, L. Havenhand, W. J. Mills. *Committee*—W. Driver, J. Chambers, G. Armitage, J. Moxon, J. Ashurst, W. H. Stubbs, J. H. Gosling, J. A. Mottershaw, W. Blythe. *Treasurer*—S. Hughes. *Secretary*—Alfred Birtles, 67 City Road, Park, Sheffield. *Assistant Secretary*—G. Walton, 314 Grimsthorpe Road, Sheffield.

Aurora Lantern Slide Club.—(ESTABLISHED 1895.)—*Treasurer and Secretary*—Rev. T. Perkins, M.A., F.R.A.S., Turnworth Rectory Blandford.

Banbury and District Photographic Society.—(ESTABLISHED 1894.)—Meetings are held at the Banbury Municipal Schools. *Committee*—Messrs. S. H. Beale, Knight, Brummitt, Blinkhorn, Orchard, Potts, Wood, H. Stanley Nicholson, C. L. Fortescue. *Secretary and Treasurer*—Seymour H. Beale, F.Ph.S.L.

Barnsley and District Photographic Society.—(ESTABLISHED 1893.)—Meetings held at the Arcade Schools, George Yard, Barnsley. *President*—O. de Mirimonde. *Vice-Presidents*—A. R. Tomlin and T. Parks, M.A. *Committee*—Messrs. Guest, Haigh, Coles, W. Taylor, J. G. Taylor, and Ogden. *Secretary and Treasurer*—A. Waterhouse 46 Dodworth Road, Barnsley. †

Barnstaple Y.M.C.A. Camera Club.—(ESTABLISHED 1901.)—Meetings held at the Y.M.C.A., 85 Boutport Street, Barnstaple. *President*—A. E. Hopper. *Vice-Presidents*—Messrs. C. H. Symons and Trayne. *Committee*—G. Pitt, C. Tresise, W. Huxtable. *Treasurer and Hon. Secretary*—W. K. Massey, 8 Belmont Terrace, Vicarage Lawn, Barnstaple.

Batley and District Photographic Society.—(ESTABLISHED 1894.)—Meetings held at the Technical Schools, Batley. *President*—Percy Sheard. *Vice-Presidents*—Messrs. Bagshaw, Buckley, Hall, Rev. J. J. Lea. *Committee*—Messrs. Stead, Standring, Rhodes, Crawshaw, Fox, Barraclough. *Treasurer*—Dr. H. Keighley. *Secretary*—Wm. H. Atkinson, Cemetery Lodge, Batley.

Barrow Naturalists' Field Club (Photographic Section).—(ESTABLISHED 1890.)—Meetings held at Cambridge Hall, Barrow. *President*—Richard Bailey. *Vice-Presidents*—C. Hewartson and W. J. Angus. *Committee*—J. Redhead, J. Timms, J. W. Osborne. *Treasurer*—T. Huddleston. *Secretary*—James Frankland, 8 Greengate Street, Barrow-in-Furness.

J. LANCASTER & SON, Birmingham.

Over 320,000 Lancaster Cameras are in daily use
all over the Globe.

FOR PARTICULARS AND PRICES SEE PAGES 487 TO 550.

Beverley Photographic and Sketching Society.—(ESTABLISHED 1893.)—

Meetings held at the Club Room, Butcher Row. *President*—Rev. R. Fisher, M.A. *Vice-Presidents*—E. R. B. Hall-Watt, J.P., Rev. W. E. Wigfall, Rev. Canon Nolloth, D.D., G. Bohn, C.E., Alderman Hobson, Alderman Green, Thomson Foley, J. W. Arnott, Rev. Prosper Coppin. *Council*—T. B. Burton, J. C. Cook, G. Dawson, H. J. Mann, F. Osgerby, C. Stephenson. *Curator*—H. J. Mann. *Treasurer*—E. B. Clarke. *Secretary*—T. J. Morley, Toll Gavel, Beverley.

Birkenhead Photographic Association.—(Affiliated with the Royal Photographic Society.)—

Meetings are held at the Y.M.C.A., Grange Road. *President*—R. J. Russell, T.C. *Vice-Presidents*—Edward Newall, F. H. Bracher, C. F. Inston. *Council*—H. Holt, J. A. Nicoll, C. F. Burne, A. S. Hume, H. P. Smith, T. J. Smith. *Hon. Lanternist*—F. H. Bracher. *Hon. Treasurer*—James Walker. *Hon. Secretary*—J. T. Peters, 62 Westbourne Road.

Birmingham Natural History and Philosophical Society.—(ESTABLISHED 1858.)—

Meetings held at Norwich Union Chambers, Congreve Street. *President*—W. H. Wilkinson, F.L.S. *Vice-Presidents*—A. H. Martineau, F.E.S. and Herbert Stone, F.L.S. *Council*—H. W. Bishop, Prof. T. W. Bridge, M.A., D.Sc., R. C. Bradley, F.E.S., R. W. Chase, M.B.O.U., J. M. Farnol, G. Johnson, B.A., Prof. C. Lapworth, LL.D., F.R.S., F.G.S., T. H. Waller, B.A., B.Sc., C. J. Watson. *Treasurer*—C. A. Harrison. *Librarian*—W. B. Grove, M.A. *General Secretaries*—W. P. Marshall, M.I.C.E. and W. B. Grove, M.A. *Assistant Secretary and Curator*—S. P. Bolton, 25 Balsall Heath Road.

Birmingham Photographic Society.—(ESTABLISHED 1884.)—

Meetings held at Norwich Union Chambers (opposite Town Hall). *President*—Whitworth Wallis, F.S.A. *Vice-Presidents*—A. J. Leeson, R. Haines, M.A., J. F. Hall Edwards, L.R.C.P., F.R.P.S., T. Taylor. *Council*—Dr. Addenbrooke, H. J. Collins, P. T. Deakin, A. Fenn, W. T. Greathatch, F.R.P.S., P. B. Rider, W. Tilt, H. Goode. *Treasurer*—Lewis Lloyd. *Secretary*—H. Vooght Cornish, Norwich Union Chambers (opposite Town Hall).

Blackburn and District Photographic Society.—(ESTABLISHED 1901.)—

Meetings are held at Barton Street School, Blackburn. *President*—J. P. Howe. *Vice-Presidents*—Hy. Neville and Rev. Joseph Farquhar, M.A. *Committee*—R. Wolstenholme, H. Jones, R. Ibbotson, D. Riding, F. Denham, W. Crossley, W. A. McLean, F. W. Benson, Rev. E. G. Wales. *Treasurer*—J. Wigglesworth. *Secretary*—Wilfrid Daxbury, 7 Queen's Place, Gawthorpe, Blackburn.

Blairgowrie and District Photographic Association.—(ESTABLISHED 1894.)—

Meetings held at the Club Room, George Street, Blairgowrie. *President*—Alexr. Geekie. *Vice-Presidents*—John B. MacLachlan and James Richardson. *Committee*—James Donaldson, Jas. D. Petrie, Alexander Mitchell, David G. Monair, William D. M. Falconer. *Treasurer*—John Cameron, Jun. *Secretary*—Lake Falconer, Jun., James' Street Cottage, Blairgowrie.

J. LANCASTER & SON, Birmingham.

Nearly Half a Million Lancaster Lenses are now in use in every Country in the World.

FOR PARTICULARS AND PRICES SEE PAGES 487 TO 550.

Blaydon and District Camera Club.—(ESTABLISHED 1900.)—Meetings held at the Free Church Hall. *President*—W. Steele. *Vice-Presidents*—R. Cubey, J. M. Gatheral, A. Payne, F.C.S., Hy. Dalton, Rev. H. P. Napier-Clavering, Dr. Morrison, Dr. J. W. Smith, Dr. Brown, Dr. Plante. *Committee*—Thos. Howdon, J. T. Ramsay, Thos. Hughes, Jno. Bales. *Treasurer*—Christopher Robson. *Secretary*—Alex. B. Cunninghame, Gelt House, Blaydon-on-Tyne.

Bognor Photographic Society.—(ESTABLISHED 1900.)—Meetings are held at London Road. *President*—Dr. F. S. Tidcombe. *Vice-Presidents*—C. J. West and F. Reynolds. *Council*—Miss Simpson, E. Humphrey, J. B. Daubeney, A. Fisher, E. L. Wood. *Secretary and Treasurer*—C. J. West, High street, Bognor.

Bolton Mutual Photographic Society.—(ESTABLISHED 1897.)—Meetings held at Lorne Street, Bolton. *President*—Colonel Hesketh. *Vice-Presidents*—Geo. Hodges, J. S. Rushton, J. Wild, A. Lee. *Committee*—W. H. Lord, H. Kellam, H. S. Prince, Jas. Morris, H. Slaney, H. Prime, Jno. Gents, Wm. Harley, W. H. Roberts, A. Robinson. *Treasurer*—Mr. Simpson. *Secretary*—A. Ormrod, 614 Chorley Old Road, Bolton.

Bolton Photographic Society.—*Secretary*—C. K. Dalton, 50 Higher Bridge Street, Bolton.

Bootle Photographic Society.—(ESTABLISHED 1894.)—Meetings are held at 324 Stanley Road, Bootle, Liverpool. *President*—Captain Sibthorpe. *Vice-Presidents*—Dr. Owen, Messrs. Bond, Heathcott, Hutchinson, Brewster, Lancaster, Dr. Saunders. *Council*—Messrs. Parry, Stewart, Fogg, Crawley, Parke, Cave, Wilkinson, Dullehan, B. Woods. *Hon. Secretary*—T. A. Lancaster. *Treasurer*—W. T. Wright. *Secretary*—L. D. Wood, 26 Ivanhoe Street, Bootle, Liverpool.

Borough Polytechnic Photographic Society.—Affiliated with the Royal Photographic Society.—(ESTABLISHED 1895.)—Meetings held at the Borough Polytechnic Institute, 103 Borough Road, S.E. *Patrons*—Edric Bayley, L.C.C., R. Child Bayley, F.R.P.S., Edward Besley, E. Lloyd, Albert T. Harris, F.S.M.C., Sir E. Durning Lawrence, Bart., M.P., Prosser Roberts. *President*—F. W. Bannister. *Vice-President*—F. W. Gregg. *Committee*—A. Bedding, E. W. Burch, H. Heath, J. W. Hodges, M. J. Lindsey, W. Page, A. M. Usher. *Hon. Lanternist*—H. C. Philcox. *Hon. Treasurer*—Geo. Fisher. *Hon. Assistant Secretary*—J. R. Bedford. *Hon. Secretary*—P. C. Cornford, 103 Borough Road, London, S.E.

"Boys' Own" Postal Photographic Club.—(ESTABLISHED 1889.)—*Secretary and Treasurer*—James Hardwich, 7 Belford Terrace, Sunderland.

J. LANCASTER & SON, Birmingham.

Over 320,000 Lancaster Cameras are in daily use
all over the Globe.

FOR PARTICULARS AND PRICES SEE PAGES 487 TO 530.

Bradford Photographic Society.—(Federated with the Yorkshire Photographic Union.)—Meetings held at the Grammar School, Manningham Lane. *President*—Alex. Keighley, F.R.P.S. *Vice-Presidents*—G. A. Bever, A. Bracewell, E. Clough, Percy Lund, G. Thistlethwaite, F. Woodall. *Committee*—J. Allinson, J. W. Bateson, S. Hampshire, J. Jackson, C. Muller, H. Pickles, J. Skirrow, C. P. Tatham, M. Wilcock, G. Wood. *Hon. Lanternists*—Frank Nicholson and W. H. Womersley. *Hon. Librarian*—J. H. Liebreich. *Hon. Treasurer*—W. C. Ramshaw. *Hon. Secretary*—Harry Akam, 21 Clarendon Terrace, Bradford. *Hon. Secretary of Portfolios*—J. H. Liebreich, 3 Oak Mount, Manningham, Bradford.

Brechin Photographic Association.—(ESTABLISHED 1888.)—Meetings held at the Y.M.C.A. Rooms, Bank Street. *President*—Wm. Shaw Adamson. *Vice-Presidents*—John Kirk and A. C. Milne. *Council*—John Steele, John M. Dunn, Geo. Douglas, D. B. Robertson (Curator), D. M. Watt (Lanternist), J. Kirk (Portfolio Editor). *Treasurer*—Robert C. Dalgity. *Secretary*—J. C. Robertson, 98 High Street, Brechin.

Erentford Photographic Society.—(Affiliated to the Royal Photographic Society.)—Meetings are held in the Committee Room, Public Baths, Clifden Road. *President*—Rev. T. Eland, M.A., F.R.G.S. *Vice-Presidents*—F. M. Ames, J. Fielder-Haden, T. Sellwood, Dr. W. H. Walter, M.D. *Committee*—S. E. Bonfellow, R. H. F. Hitchens, A. R. Read, jun., W. J. Squire. *Entertainment Secretary*—T. Sellwood. *Hon. Secretary and Treasurer*—Hilton Grundy, 30 Whitestile Road.

Brierley Hill and District Camera and Field Club.—Meetings held at the Church Institute, Church Street. *President*—Ald. J. Addison. *Vice-Presidents*—H. Parry, W. Cochrane, H. Price, F. Gibbons, H. B. Cookson, J. E. Breeze, J. Thomas. *Committee*—Wm. Northwood, W. Grainger, A. Gibbons, W. Whitworth, R. Lythgoe, M. Rollinson, A. J. Slater, T. Hughes. *Treasurer*—Geo. Carder. *Secretary*—Wm. Chas. Jones, Stratford House, Brierley Hill.

Brighouse Photographic Society.—(ESTABLISHED 1894.)—Meetings held at the Studio, Town Hall, Brighouse. *President*—Dr. Geo. A. Farrer. *Vice-Presidents*—A. H. Ormerod, Geo. Hepworth, J. E. Longbottom. *Council*—Messrs. Hy. Sugden, H. Mitchell, H. P. Metcalfe, Robinson, F. Cooke, F. Healey, F. Hirst. *Treasurer*—John Wood. *Secretaries*—F. W. Crowther, 11 Riding Terrace, Brighouse, and J. H. Georgeson, Cairnduna, Brighouse.

Bristol and West of England Amateur Photographic Association.—(ESTABLISHED 1866.)—Meetings held at 20 Berkeley Square, Clifton, Bristol. *President*—H. A. Hood-Daniel. *Vice-Presidents*—M. Lavington and H. Ormerod. *Committee*—President, Vice-Presidents and Treasurer, and T. Butler, S. J. Hill, H. O. Isaac, Dr. R. G. P. Lansdown, W. Norgrove. *Treasurer*—W. Moline. *Secretary*—Guy Chilton, 34 Baldwin Street, Bristol.

J. LANCASTER & SON, Birmingham.

Nearly Half a Million Lancaster Lenses are now in use in every Country in the World.

FOR PARTICULARS AND PRICES SEE PAGES 487 TO 550.

British Association for the Advancement of Science.—(ESTABLISHED 1831.)—Meetings to be held in 1903 at Southport (September 9-16). In 1904, Cambridge. *President*—Professor James Dewar, F.R.S. *President Elect*—Sir J. Norman Lockyer, K.C.B., F.R.S. *Treasurer*—Professor G. Carey Foster, F.R.S. *General Secretaries*—Dr. D. H. Scott, F.R.S., and Major P. A. MacMahon, R.A., F.R.S. *Assistant General Secretary*—Dr. J. G. Garson, Burlington House, London, W.

British Postal Camera Club.—*Committee*—Mrs. Cottam (Bournemouth) H. C. Leat (Bristol), P. H. Mason (Croydon). *Treasurer and Secretary*—Hugh Price, Dennis Vale, Stourbridge.

Brixton and Clapham Camera Club.—(ESTABLISHED 1889.)—Meetings held at Brixton Hall, Acre Lane, S.W. *Vice-Presidents*—F. W. Levett, J. W. Cundall, W. Fraser. *Council*—C. E. Scales, A. R. Clinch, L. W. R. Cundall, T. R. Mosford, R. Fisher, W. Steers. *Lanternist*—R. G. Mason. *Secretary*—W. H. Stoneman, 11 Endymion Road, Brixton Hill, S.W. *Assistant Secretary*—L. W. R. Cundall,

Bromley (Kent) Camera Club.—(ESTABLISHED 1896.)—Meetings held at the School of Science and Art, Bromley, Kent. *President*—S. B. Webber. *Vice-Presidents*—W. Willis and Thos. Davis. *Committee*—John Scott (chairman), A. S. Hicks, Geo. Weeks, A. J. Hall, A. W. Dickins. *Hon. Secretary and Treasurer*—E. W. Andrew, 90 College Road, Bromley, Kent.

Bromsgrove School Photographic Society.—(ESTABLISHED 1893.)—Headquarters, Bromsgrove School. *President*—Rev. J. L. Langdon-Fulford, M.A. *Hon. Treasurer*—L. E. Barrington Wood. *Hon. Secretary*—R. Lakin, The School, Bromsgrove, Worcestershire.

Burnley Camera Club.—(ESTABLISHED 1897.)—Meeting held at Mechanics' Institution, Burnley. *President*—Frederick Heap. *Vice-Presidents*—Dr. Crump, B.A., W. Sutcliffe, B. Slater, F. Pinder. *Committee*—A. S. Bellingham, T. Walton, A. Harrison, J. Walton, A. Greenwood, W. T. Clegg. *Secretary*—Percy Brotherton, Express Office, Burnley.

Burton-on-Trent Natural History and Archæological Society (Photographic Section).—(ESTABLISHED 1889.)—Meetings held at the Young Men's Christian Association. *President*—A. L. Stern, D.Sc., F.I.C. *Treasurer and Secretary*—H. H. Port, 103 Scalpcliffe Road.

Bury Camera Club.—(ESTABLISHED 1900.)—Meetings held at the Studio, Fishpool. *President*—W. H. Ward. *Vice-Presidents*—E. W. Mellor, J.P., Roger Wood, H. M. Dearden. *Committee*—A. Ashworth, G. Ross, T. M. Barbour, T. Hayhurst, J. W. Smith. *Treasurer*—J. Nichols. *Secretary*—Joseph Nichols, 36 Nelson Street, Fishpool, Bury.

Bury St. Edmund's Camera Club.—(ESTABLISHED 1894.)—*President*—Dr. Image. *Vice-President*—W. Patrick. *Committee*—Miss Image, Mrs. Manson, Miss Snell, Messrs. Barkway, Cousins, Death, Moore, Wiggin (Portfolio Secretary). *Hon. Secretary and Treasurer*—Owen A. Clark, 12 Abbeygate Street, Bury St. Edmunds.

J. LANCASTER & SON, Birmingham.

Over 320,000 Lancaster Cameras are in daily use
all over the Globe.

FOR PARTICULARS AND PRICES SEE PAGES 487 TO 550.

Cambridge Y.M.C.A. Camera Club.—*President*—F. W. Bird. *Vice-President*—W. H. Hayles. *Committee*—Dr. Bansall, S. Cowles, J. Patten, A. Smith, H. L. Smith, T. Sowdon, J. Tyler. *Hon. Secretaries*—A. C. Crossman and Jno. Johnson.

Camera Club.—(ESTABLISHED 1885.)—Meetings are held at the Club House, 23 Charing Cross Road, W.C. *President*—Sir Wm. H. W. Abury, K.C.B., F.R.S., &c. *Hon. Secretary*—Wallace Godfrey, M.A. *Secretary*—M. A. Cromack, Camera Club, Charing Cross Road.

Camera & Company, A Postal Photographic Club.—(FORMED 1891.)—*Secretary*—Frank H. Read, Ferndale, Clifden Road, Brentford, Middlesex.

Camera Guild.—(Limited to Fifty Members.)—*President*—Thos. Ross. *Vice-Presidents*—Robert D. Howatt and James Scott. *General Committee*—Messrs. Ross, Howatt, Haggart, Smart, Scott, Powrie, McLeod, Brough. *Portfolio Secretary*—John Smart. *Librarian*—Alexander McLeod. *Recorder*—Peter Brough. *Hon. Treasurer*—Charles Powrie. *Hon. Secretary*—John B. Haggart, 93 Norfolk Street, Glasgow.

Jamerists' Postal Photographic Club.—*Secretary*—S. F. Talbot, 31 Alkham Road, Stoke Newington, London.

Cardiff Photographic Society.—Meetings held at the Society's Rooms, 7 and 8 Working Street. *President*—Rev. J. E. Dawson. *Vice-Presidents*—Miss Dawson, S. W. Allen, W. Booth, A. McKinnon, W. J. Jenkins, S. C. Fox. *Council*—S. W. Allen, W. Booth, S. C. Fox, J. B. Hopkins, W. J. Jenkins, A. McKinnon, W. J. Milkins, J. R. Stephens, D. Tidl. *Treasurer*—G. P. Nance. *Hon. Secretary*—R. Clay, Western Mail Chambers.

Cardiff Y.M.C.A. Camera Club.—(ESTABLISHED 1895.)—Meetings held at the Y.M.C.A., Queen Street, Cardiff. *President*—J. Thompson Willows, L.D.S., R.C.S. *Vice-Presidents*—Dr. De Vere Hunt, F.R.M.S., R. Cory, J.P., Jesse Williams, M.P.S. *Committee*—C. W. Thompson, L. J. Burch, W. Watts, W. C. Cooper, R. James. *Treasurer*—G. P. H. Buston. *Secretary*—J. E. Blackburne, 136 Cathedral Road, Cardiff.

Carlisle and County Amateur Photographic Society.—(ESTABLISHED 1885.)—Meetings held at the Art Gallery, Tullie House, Carlisle. *President*—Rev. Canon Bower. *Vice-Presidents*—J. A. Wheatley, J.P., T. S. Strong, L. Carr, J. Beaty. *Committee*—R. M. Hill, A. Hill, J. Halhead, R. Hendry, S. W. B. Jack, J. Robson (Lanternist), W. Wright. *Treasurer*—John Robson. *Secretary*—D. Hodgson, The Hollins, Newby (West), Carlisle.

Cheltenham Amateur Photographic Society.—(ESTABLISHED 1865.)—Meetings held at the College Pharmacy, Bath Road, Cheltenham. *President*—General F. Dawson, C.B. *Vice-President*—W. Beetham. *Secretary*—Philip Thomas, College Pharmacy, Bath Road, Cheltenham.

J. LANCASTER & SON, Birmingham.

Nearly Half a Million Lancaster Lenses are now
in use in every Country in the World.

FOR PARTICULARS AND PRICES SEE PAGES 487 TO 550.

Chester Society of Natural Science, Literature, and Art (Photographic Section).—(ESTABLISHED 1887.)—Meetings held at the Grosvenor Museum, Chester. *Chairman of Section*—Dr. Stollerforth, M.A., J.P. *Committee*—Lieut.-Colonel Dowdall, F. Garside, A. E. Goodman, A. Lamont, F. W. Longbottom, W. F. J. Shepherd, F.C.S. *Treasurer and Secretary*—J. A. McMichael, B.Sc., 39 Parkgate Road, Chester.

Chichester Photographic Society.—(ESTABLISHED 1893.)—Meetings held at the Technical Institute. *Patrons*—The Lord Bishop of Chichester, Lord Edmund Bernard Talbot, M.P. *President*—F. B. Tompkins. *Vice-Presidents*—Dr. André, Dr. E. H. Buckell, Rev. J. Henderson, Col. Kilgour, Dr. Paxton, J.P., G. Woodbridge, J.P. *Committee*—R. W. Dawtrey, S. A. Garland, E. Hooper, J. Huskinson, T. H. Vinall, H. G. Wildman. *Treasurer*—J. W. Barnes. *Secretary*—G. M. Turnbull, Lyndhurst Lodge.

Chiswick Camera Club.—(ESTABLISHED 1896.)—Meetings held at "Devonshire" Room, Town Hall, Chiswick. *President*—W. E. Walker. *Vice-Presidents*—G. D. Fowle and H. Gentry. *Council*—E. Davis, S. Day, R. Dean, H. Hucklebridge, S. G. Redman, J. Webber, E. R. H. Wingfield, J. Woodger. *Delegates*—E. Styles and T. A. Coysh. *Treasurer*—H. E. Ward. *Secretary*—J. Mann, 9 Cambridge Road, Chiswick.

Chorley Photographic Society.—(ESTABLISHED 1894.)—Meetings held at the Club Rooms, Devonshire Road, Chorley. *President*—H. N. Whittle, Esq. *Vice-Presidents*—Jno. Stanton, Jno. Lawrence, J. T. Brierley, F.C.S., N. Alker, T. Haworth, J. R. Waring, T. Brindle, J. Blackshaw, A. S. Buckley. *Committee*—A. Watson, J. Rawlinson, W. Swarbrick, E. H. Hill, Jas. Fletcher, J. Withnell, Misses Greenall, Whittle and Ashton. *Treasurer*—R. Gill. *Secretary*—H. R. Dorning, M.P.S., 8 Pall Mall, Chorley.

City and Guilds of London, Technical College, Finsbury, Photographic Society.—(ESTABLISHED 1887.)—Meetings held at the Technical College, Leonard Street, City Road, E.C. *President*—Raphael Meldola, F.R.S., F.I.C., F.C.S., etc. *Vice-Presidents*—J. Castell-Evans, F.I.C., F. W. Streatfeild, F.I.C., F. Southerden, F.I.C. *Committee*—H. W. Winter, J. Rattenbury, H. Staynes, R. Higgins. *Treasurer*—T. H. Norris, F.I.C. *Secretary*—Sydney J. Johnstone, 15 Springfield Road, New Southgate, London.

City of Belfast Y.M.C.A. Camera Club.—Meetings held at the Y.M.C.A., Wellington Place. *President*—R. G. Moffitt. *Hon. Treasurer*—J. McCleery. *Hon. Secretaries*—James McCleery and Hugh Cochrane, jun., Y.M.C.A., Wellington Place, Belfast.

J. LANCASTER & SON, Birmingham.

Over 320,000 Lancaster Cameras are in daily use
all over the Globe.

FOR PARTICULARS AND PRICES SEE PAGES 487 TO 550.

City of Dublin Y.M.C.A. Camera Club.—(ESTABLISHED 1891.)—Meetings held at 43 Upper Sackville Street, Dublin. *President*—E. MacDowel Cosgrave, M.D. *Vice-Presidents*—Greenwood Pim, M.A., Victor Smyth, J. C. Ruthven, Leonard R. Strangways, M.A., Fred Eason. *Council*—G. A. Parnell, A. E. Campbell, Charles E. Stewart, G. W. Riky, J. Gordon, E. Stevenson, J. A. Ray, R. Poynton. *Ladies' Committee*—Miss Owens, Miss Aston, Miss Carnegie. *Hon. Treasurer*, R. J. Wilkin. *Hon. Secretary*—George M. Roche, Cambridge House, Montpelier Hill, Dublin.]

Cleveland Camera Club.—Meetings are held at the Literary and Philosophical Society's Rooms, Corporation Road, Middlesbrough. *President*—Col. S. A. Sadler, V.D., M.P. *Vice-Presidents*—R. Moore, G. D. Winter, W. Downs, A. Hutchinson, J. J. Burton, L. F. Giers, R. E. Howell, M.D. *Committee*—H. W. Hood, A. G. Hood, T. W. Windross, T. J. Kedward, H. J. Simmons, H. R. West, T. Misseldine. *Lanternist*—J. J. Dales. *Portfolio Secretary*—Miss B. Sampson. *Hon. Secretary and Treasurer*—Fred. W. Pearson, 98 Victoria Road, Middlesbrough.

Colne Camera Club.—(ESTABLISHED 1892.)—Meetings held at the Cloth Hall. *President*—Rev. T. Leyland. *Vice-Presidents*—J. Duckworth, J. Hey, Councillor Hewitt, H. Holgate, Alderman R. Foulds, A. P. Threlfall, E. Christian, R. T. Lawson, C. V. Greenwood. *Treasurer*—J. Robinson. *Secretary*—E. A. Spivey, 27 Calder Street, Colne, Lancashire.

Cornish Camera Club.—(ESTABLISHED 1888.)—Meetings held at The Studio, Penzance. *President*—W. E. Baily, C.C. *Vice-President*—R. Pearce Couch. *Committee*—H. Stewart, H. Bradbury, W. Colenso, H. Wood. *Treasurer*—Arthur G. Pool. *Secretary*—H. Tonkin, 22 Market Place, Penzance, Cornwall.

Cornwall Central Photographic Club.—(ESTABLISHED 1900.)—Meetings held at the Central Technical Schools for Cornwall, Truro. *President*—Professor Clark. *Committee*—A. W. Gill, F. J. Boundy, R. Moss, W. G. Bennetts, W. A. Rollason, T. G. Martyn, E. H. Davison. *Treasurer*—Miss Ethel A. Reynolds. *Secretary*—Alex. Gregg, Central Technical Schools, Truro.

Coventry Photographic Club.—Meetings held at 7 Little Park Street. *President and Treasurer*—H. D. Waters. *Vice-Presidents*—H. J. Goodwin, W. Riley, O. W. Barry, W. H. McLauchlan. *Hon. Vice-Presidents*—W. Andrews, A. G. Paterson, H. Sturme, H. Rotherham. *Committee*—J. I. Bates, M. W. Danks, F. Peirson, J. K. Starley. *Auditors*—S. Read and S. H. Bird. *Hon. Secretary*—W. H. McLauchlan, 5 Chester Street.

J. LANCASTER & SON, Birmingham.

Nearly Half a Million Lancaster Lenses are now
in use in every Country in the World.

FOR PARTICULARS AND PRICES SEE PAGES 487 TO 550.

Cricklewood Photographic Society.—(ESTABLISHED 1902).—Meetings held at 15 Anson Parade, Cricklewood, N.W. *Patron*—Dr. J. J. Acworth. *President*—J. Stevenson. *Vice-Presidents*—E. W. Houghton, J. B. King, Wilfred Emery. *Committee*—J. T. Davies, H. B. Scott, W. J. Uttin, R. R. MacLaren, W. E. Seaward, P. H. Williams, L. M. Wilde. *Hon. Treasurer*—W. H. Longhurst. *Hon. Secretary*—Frank V. H. Watts, "Ivydene," Ivy Road, Cricklewood, N.W.

Cripplegate Photographic Society.—(ESTABLISHED 1899).—Meetings held at Cripplegate Institute, Golden Lane, E.C. *President*—Chairman of the Cripplegate Foundation. *Vice-Presidents*—Governors of Cripplegate Foundation. *Committee*—G. Pitt-Smith (chairman), H. E. Clarke, G. H. Depledge, F. H. Dowdell, A. B. Moss, H. V. Smith, G. Vogeler. *Treasurer*—H. Gordon Stollard. *Secretary*—Alfred T. Ward, 42 Mill Hill Road, Acton, W., and Cripplegate Institute.

Croydon Camera Club.—(ESTABLISHED 1890.)—Meetings held at 106 George Street, Croydon. *President*—Hector Maclean, F.G.S., F.R.P.S. *Vice-Presidents*—The Mayor of Croydon (Councillor H. Page), The Deputy-Mayor (Alderman G. J. Allen), Right Hon. C. T. Ritchie, M.P., Sir David Salomons, Bart., Sir Frederick Edridge, J.P., James Glaisher, F.R.S. *Council*—H. M. Bennett, R. H. Edgar, Ben. E. Edwards, F. W. Hicks, H. E. Holland, A. E. Isaac, G. W. Jenkins, J. Noaks, W. H. Rogers, W. H. Smith, S. H. Wratten. *Treasurer*—J. H. Stanley, sen. *Secretary*—E. A. Salt, 76 Heathfield Road, South Croydon.

Croydon Natural History and Scientific Society.—(ESTABLISHED 1870. — *President*—Jas. Epps, jun., F.L.S. *Vice-Presidents*—Edward Lovett, Henry T. Mennell, F.L.S., William Whitaker, B.A., F.R.S., F.G.S. *Council*—W. Bruce Bannerman, F.S.A., F.G.S., J. Edmund Clarke, B.A., B.Sc., F.G.S., H. D. Gower, J. M. Hobson, M.D., B.Sc., E. A. Martin, F.G.S., J. Watson Slack, W. W. Topley. *Hon. Curator of Museum*—N. F. Roberts, F.G.S. *Hon. Lanternist*—J. H. Baldoock F.C.S. *Hon. Librarian*—Alfred Roods. *Hon. Treasurer*—F. J., Townend. *Hon. Secretary*—George W. Moore, 15 Dornton Road South Croydon.

Darwen Photographic Association.—(ESTABLISHED 1894.)—Meetings held at Belgrave Schools, Darwen. *President*—George Butterworth. *Vice-Presidents*—Coun. Ralph Shorrocks, Robt. Gillibrand, J.P., James Cooper, J. F. Leach, Coun. Dr. Ballantyne, Dr. Heywood. Dr. Haworth, Dr. DuCane, J. W. Smith, Thos. Roberts. *Council*—James Cook, Albert Almond, John Cooper, Robert Preston, Wm. Baxendale, Ewart Jepson, R. Ibbotson, Rd. Holden, Jas. Cavis, John Wild, John Cross, Fred Wild, A. V. Worden, F. Fielding. *Librarian*—William Walsh. *Lanternists*—Messrs. Butterworth and Holden. *Survey Secretary*—J. W. Smith. *Hon. Treasurer*—F. J. Nuttall. *Hon. Secretary*—J. G. Thomas, Fern] Cottage, Sough Road, Darwen.

J. LANCASTER & SON, Birmingham.

Over 320,000 Lancaster Cameras are in daily use
all over the Globe.

FOR PARTICULARS AND PRICES SEE PAGES 487 TO 550.

Deal and Walmer Camera Club.—Meetings held at Blackburn Institute, Deal, Kent. *Chairman*—J. N. Mugford. *Treasurer*—S. Manser. *Secretary*, J. Turk, 73 College Road, Deal.

Derby Photographic Society.—(ESTABLISHED 1884.)—Meetings held at the Grand Jury Room, Town Hall, Derby. *Patron*—Sir W. de W. Abney, K.C.B., D.C.L. *President*—Bendle Moore. *Vice-President*—C. Barrow Keene, F.R.P.S. *Committee*—C. Bourdin, H. G. W. Dawson, S. Finney, J. Fleet, F. C. Smithard, F. G. Smith, G. Walker, T. Walker, F. Willatt. *Treasurer*—F. H. Gandy. *Secretary*—J. B. Copeland, Leahurst, Normarton, Derby.

Devonport Camera Club.—(ESTABLISHED 1891.)—Meetings held at the Technical Schools. *President*—R. J. Lamb. *Vice-Presidents*—C. Croydon, J.P., F.R.M.S., J. F. Coombes, W. H. Lethbridge, J. T. Trend. *Committee*—R. O. Joliffe, W. H. Mayne, R. Maw, A. Tresise. *Delegates*—Dr. E. S. Saunders and R. J. Lamb. *Treasurer*—F. B. Langdon. *Secretary*—A. J. Catford, 78 Charlotte Street, Devonport.

Doncaster Camera Club.—(ESTABLISHED 1895.)—Meetings held at Albany Hotel. *President*—C. R. Girdlestone. *Vice-Presidents*—E. Gledhill and E. E. Burgess. *Committee*—W. Yates, F. Buckley, H. W. Cornelius, W. H. White, A. Button. *Treasurer*—H. Emblow. *Secretary*—T. Haigh Connor, jun., 39 Market Place, Doncaster.

Dorset Amateur Photographic Association.—(ESTABLISHED 1886.)—Meetings held at various places in the county. *President*—Rev. W. Miles Barnes, M.A. *Committee*—R. W. Copeman, Hermann Lea, A. D. Moulin. *Treasurer and Secretary*—Rev. T. Perkins, M.A., F.R.A.S. Turnworth Rectory, Blandford.

Dukinfield Photographic Society.—(ESTABLISHED 1888.)—Meetings held at Co-operative Hall, Dukinfield. *President*—Thomas Hodgetts Gordon, B.A., C.C. *Vice-Presidents*—D. Firth, H. L. Hadfield, P. Rigby, W. Jenkinson. *Council*—S. T. Ainsworth, J. W. Andrew, J. Gill, W. Jenkinson, F. Thompson, E. Till, R. Rugby, J. Winterbottom. *Treasurer*—H. L. Hadfield. *Hon. Secretary*—D. Firth, Hall Green, Dukinfield. *Assistant Hon. Secretary*—Percy C. Firth.

'Dundee Advertiser' Photographic Club.—(ESTABLISHED 1894.)—Meetings held at Dundee Advertiser Office, Dundee. *Hon. President*—Sir John Leng, M.P., J.P., D.L. *President*—J. L. Scott. *Vice-President*—Wm. G. Swan. *Committee*—Robert Patterson, Edmund Roscoe, Wm. C. Clark. *Secretary and Treasurer*—Archibald Campbell, Stewart Terrace, Barnhill, Broughty Ferry.

Dundee and East of Scotland Photographic Association.—(ESTABLISHED 1879.)—Meetings held at University College, Dundee. *President*—Dr. J. K. Tulloch. *Vice-Presidents*—G. D. Macdougald and G. Worrall. *Committee*—Dr. W. C. Cowan, B. Gray, O. B. Hatch, W. F. Linn, G. G. Ritchie, H. Drummond, W. Bertie, A. Campbell, J. S. Lawson, A. M. Macdiarmid, J. Ogilvie, J. Peebles. *Secretary and Treasurer*—V. C. Baird, Broughty Ferry, N.B.

J. LANCASTER & SON, Birmingham.

Nearly Half a Million Lancaster Lenses are now
in use in every Country in the World.

FOR PARTICULARS AND PRICES SEE PAGES 487 TO 550.

Durham City Camera Club.—(ESTABLISHED 1892.)—Meetings are held at the Shakespeare Hall, North Road, Durham. *President*—W. Moulton. *Vice-Presidents*—E. Meynell, J. F. Hobson, W. Gray. *Committee*—F. W. Cluff, T. Harker, J. Morson, jun., J. Sanderson, A. E. Thwaites. *Treasurer*—J. Pennington. *Secretary*—C. A. Chapman, 23 The Avenue, Durham.

Ealing Photographic Society.—(ESTABLISHED 1890.)—Meetings held at the Public Buildings, Ealing. *President*—W. T. White. *Vice-Presidents*—C. Jones and Thos. Simpson. *Council*—H. A. Ball, G. B. Clifton, G. Fryer, S. Stewart, E. W. Pelling, J. Hughes. *Treasurer*—A. F. Taylor. *Secretary*—J. Watson, 2 Waldeck Road, Ealing, London, W.

Eastbourne Photographic Society.—(ESTABLISHED 1892.)—Meetings held at Caldecott Museum Building, Lismore Road. *President*—H. Habgood, M.D. *Vice-Presidents*—H. M. Whitley, Dr. Macqueen, Major Molineux. *Committee*—Messrs. Kelsey, Sparrow, Plomer, Sparks, Lane, Wright, Bedford. *Treasurer and Secretary*—John J. Holloway, Glengariff, Willingdon Road, Eastbourne.

East Liverpool Photographic Society.—(ESTABLISHED 1902.)—Meetings held at 10 Albion Street, Everton. *Committee*—Messrs. Ball, Edwards, Manlond, Pearson, Robson, Walker, Ward. *Secretary*—C. R. Pearson, 5 Breck Grove, Everton, Liverpool.

Eccles Photographic Society.—*President*—Penry Williams. *Vice-Presidents*—E. Johnson and D. Lawton. *Treasurer*—W. J. Scholes. *Committee*—A. Atkinson, S. Brogden, J. Dale, F. Harcourt, W. Hulme, J. P. Jackson, A. L. Walton. *Secretary*—F. T. Smith, 16 Albert Street, Eccles.

Edinburgh Photographic Club.—(ESTABLISHED 1881.)—Meetings held at 38 Castle Street. *President*—James B. Johnston. *Committee*—President, Treasurer, Secretary. *Treasurer*—Geo. Cleland. *Secretary*—T. Barclay, 180 Dalkeith Road, Edinburgh.

Edinburgh Photographic Society.—(ESTABLISHED 1861.)—Meetings held at 38 Castle Street. *Hon. Presidents*—Hippolyte J. Blanc, R.S.A. and John Stewart Smith. *President*—James Burns. *Vice-Presidents*—David M'Arthy and John Warrack, jun. *Council*—H. Scott Lauder, Dep. Insp. Genl. R.N., R. H. M'Bean, H. Stewart Wallace, W.S., Frank C. Inglis, J. Tudor Cundall, B.Sc. (Lond.), John Mackintosh, Joseph C. Lennie, F. P. Moffat, James Craig, R. S. Webster James Murdoch, W. J. Crear. *Curator*—John Anderson. *Treasurer*—George Cleland. *Secretary*—J. S. M'Culloch, W.S. 3a North St. David Street.

J. LANCASTER & SON, Birmingham.

Over 320,000 Lancaster Cameras are in daily use
all over the Globe.

FOR PARTICULARS AND PRICES SEE PAGES 487 TO 550.

Exeter Camera Club.—(ESTABLISHED 1892.)—Meetings are held at Barnfield House. *President*—C. R. M. Clapp. *Vice-Presidents*—J. W. Huggins, C. Cole and W. Lloyd-Jones. *Committee*—T. A. Goad, J. W. Lake, A. West, J. Pearse. *Treasurer*—J. Hinton Lake. *Secretary*—Rev. J. Sparshatt, St. Olave's Rectory.

Exeter Hall Photographic Society.—(ESTABLISHED 1898.)—Meetings held at Exeter Hall, Strand, W.C. *President*—Rev. F. C. Lambert, M.A. *Vice-Presidents*—H. Conder, John H. Putterill, W. H. Smith, W. Wilson Hind-Smith, F.R.G.S. *Committee*—R. W. Clarke, H. Grace, W. Green, John W. Hobday, F. R. Rose. *Hon. Editor*—C. G. Paul. *Captain Cycling Section*—E. Lutman. *Hon. Treasurer*—J. H. Butler, *Hon. Secretary*—W. E. Longhurst, Lightfoot House, Hornsey, N.

Fakenham Literary, Field, and Camera Club.—(ESTABLISHED 1892.)—Meetings held at the Club Room, Norwich Street, Fakenham, Norfolk. *President*—Algernon Digby, M.A. *Vice-Presidents*—Rev. Canon Humphreys, M.A., Rev. W. Martin, B.A. Rev. J. Lee Warner, M.A., Thos. Charlton, Dr. W. H. Fisher, Dr. F. L. Pochin. *Committee*—Dr. F. L. Pochin, (chairman), Joseph Baker, C. J. Elliott, Horace J. Heyhoe, W. O. Miller, T. E. Pengelley, J. Wainwright. *Treasurer and Secretary*—Henry Newson, The Square, Fakenham, Norfolk.

Falkirk Amateur Photographic Association.—(ESTABLISHED 1889.)—Meetings held at the Club Room, Newmarket Street, Falkirk. *President*—Wm. C. Murray. *Vice-President*—Wm. Hamilton. *Committee*—W. P. Crosbie, John Wilson, J. Harley, Thos. Easton, Robert Lyon, J. Higgins. *Treasurer*—Robert Sinclair. *Secretary*—John Bacon, 18 Mungahhead Road. *Assistant Secretary*—Frank Currie, Russel Street.

Fylde Amateur Photographic Society.—(ESTABLISHED 1895.)—Meetings held at Blower's Restaurant, South Shore, Blackpool. *President*—Rev. A. T. Hogg. *Committee*—Dr. Vinter, J. Smith, J. W. Leach. *Treasurer*—W. Sexton. *Secretary*—Harold Kenyon, Moore Street, South Shore, Blackpool.

Gainsborough and District Camera Club.—(ESTABLISHED 1894.)—Meetings held at 21 Beaumont Street, Gainsborough. *President*—H. C. H. Allanby. *Vice-President*—F. J. Cribb. *Committee*—L. S. Short, C. Marshall, W. Muir. *Treasurer and Secretary*—Rob. C. Puckering, Clinton House, Gainsborough.

Gateshead Teachers' Natural History Society and Field Club (Photographic Section).—(ESTABLISHED 1900.)—Meetings held at the Higher Grade School, Durham Road. *President*—J. Bidgood, B.Sc., F.L.S. *Vice-President*—Miss E. M. Johnson. *Treasurer*—Walter Walker. *Secretary and Curator*—W. H. Young, Higher Grade School, Durham Road, Gateshead.

J. LANCASTER & SON, Birmingham.

Nearly Half a Million Lancaster Lenses are now
in use in every Country in the World.

FOR PARTICULARS AND PRICES SEE PAGES 487 TO 550.

Glasgow Eastern Amateur Photographic Association.—(ESTABLISHED 1897.)—Meetings held at 12½ Landressy Street, Bridgeton Cross, Glasgow. *President*—A. D. Inglis. *Vice-Presidents*—Matt. Crosbie and James Kennedy. *Council*—A. Allan, jun., Matt. Wilson, Geo. R. Johnstone, D. Johnston, Geo. May, R. McMillan. *Lanternist*—John Gillespie. *Treasurer*—Alex. McDuff. *Secretary*—John Brough, 63 Dalmarnock Street, Parkhead.

Glasgow Southern Photographic Association.—(ESTABLISHED 1901.)—Meetings held at the Y.M.C.A. (Southern Branch). *President*—David Horn. *Vice-President*—R. Burns Thomson. *Committee*—David Linton, E. J. Grant, R. Aitchison, W. Frame, J. Pottie, W. Morrison. *Treasurer*—Wilton J. Rix. *Secretary*—James M. McLean, 35 Lambhill Street, Paisley Road West. *Assistant Secretary*—R. Lindsay, 189 Allison Street.

Glasgow and West of Scotland Amateur Photographic Association.—(ESTABLISHED 1883.)—Meetings held at 180 West Regent Street, Glasgow. *President*—Andrew Brown. *Vice-President*—J. Imbrie Fraser. *Treasurer*—W. J. B. Halley. *Secretary*—Wm. Goodwin, 3 Lynedoch Street.

Glenalmond Photographic Club.—(ESTABLISHED 1890.)—Meetings held at Trinity College, Glenalmond. *President*—Arthur S. Reid, M.A., F.G.S. *Vice-President*—E. S. Lyttel. *Committee*—The Executive Officers of the Club. *Librarian*—H. S. Burn. *Treasurer*—E. W. Brodie. *Secretary*—T. J. McCall, Trinity College, Glenalmond, Perthshire.

Glossop Y.M.C.A. Photographic Society.—(ESTABLISHED 1900.)—Meetings held at Victoria Street. *President*—Captain S. H. Wood, J.P., D.L. *Chairman*—Rev. H. T. Dudley, M.A. *Treasurer*—J. Walkden. *Secretary*—T. W. Sharpe, 14 Hollincross Lane.

Gloucestershire Photographic Society.—Meetings held at the Municipal Schools of Science and Art. *President*—R. Read. *Vice-President*—G. Sheffield Blakeway. *Committee*—Drs. Campbell and Clark, Messrs. Dugdale, Wells, Lambert, Medland. *Treasurer*—J. Tibbitts. *Secretary*—Edward A. Ind, 36 Northgate, Gloucester.

Goldsmiths' Institute Photographic Society.—(ESTABLISHED 1893.)—Meetings held at the Goldsmiths' Institute, New Cross, S.E. *President*—Rev. C. H. Grundy. *Vice-Presidents*—J. Redmayne, M. Birley, W. T. Wilkinson, Dr. Lapworth. *Committee*—Miss E. Beattie, Miss G. I. Short, H. W. Mayo, J. Turner, C. B. Storey, R. R. Woodman. *Treasurer*—T. P. Rogers. *Hon. Ladies' Secretary*—Miss D. H. Tupper. *Assistant Hon. Secretary*—W. Jacob. *General Hon. Secretary*—A. H. Downey. *Address of Secretaries*—The Goldsmiths' Institute, New Cross, S.E.

J. LANCASTER & SON, Birmingham.

Over 320,000 Lancaster Cameras are in daily use
all over the Globe.

FOR PARTICULARS AND PRICES SEE PAGES 487 TO 550.

Graphic Society—(ESTABLISHED 1885.)—Meetings held at various places.

President—Miss Steele, Mr. Mickledood, Miss Wheeler, Mr. Carkeet, with President, Treasurer, and Secretary. *Treasurer*—Mr. Watson. *Secretary*—J. S. Hawker, Mutley House Plymouth.

Gravesend and District Photographic Society—(RE-ESTABLISHED 1900).—

Meetings held at the Medical Hall, 152 Milton Road. *President*—Chas. W. Hastings. *Vice-Presidents*—Rev. E. Mott, M.A., G. M. Arnold, J.P., Capt. Williams, I. C. Johnson, J.P. *Committee*—F. T. Grant, G. T. Simmons, J. A. Mitchell, Jno. Gunn, A. Swift, A. Carpenter, A. L. Cossey, A. A. Gillitt. *Hon. Lanternist*—A. E. Pickering. *Treasurer*—J. H. Cooper, jun., 195 Parrock Street. *Secretary*—Thos. L. Winnett, 5 The Grove, Gravesend.

Gravesend and Milton Society—(ESTABLISHED 1901.)—Meetings held at

Lord Street, Gravesend. *President*—Wm. Tingey. *Vice-Presidents*—Mr. Edmunds and Rev. W. W. D. Campbell. *Committee*—W. Hurst, J. Gunn, J. Cunningham, T. Porter, C. Swaisland, R. Swift. *Treasurer*—J. Cooper. *Secretary*—William May, 3 St. John's Road, Gravesend.

Great Yarmouth and District Camera Club—Meetings held at 156 King

Street. *President*—Fleet-Surgeon S. T. O'Grady, R.N. *Hon. Secretary*—T. J. Wigg, Holland House, 81 North Quay, Great Yarmouth.

Greenock Camera Club—*President*—James Wright. *Vice-President*—

Robert Tough, jun. *Council*—The Officers and A. M'Vicar, George Dunlop, G. T. Poulter, R. W. Jamieson, W. Morrison, Miss Morrison, Miss Prentice, W. D. Boyd, W. James, Alex. Watson. *Lanternist*—Richard Jones. *Secretary and Treasurer*—James S. Mearns, 2 Watt Place.

Guildford Photographic Society—Meetings are held at the Guildford and

Working Men's Institute, Guildford. *President*—The Right Hon. the Earl of Onslow, G.C.M.G. *Vice-Presidents*—G. J. Jacobs, R. W. Robinson, J. Russell, F. Wheeler. *Committee*—A. W. Bullen, E. W. Bradden, A. E. Moon, W. T. Patrick, W. R. Philpot, H. C. Reid. *Treasurer*—J. H. Nunn. *Secretary*—H. M. Moon, St. Hildas, Sydenham Road, Guildford.

Hackney Photographic Society—(ESTABLISHED 1889.)—Meetings held at

the Pembury Tavern, Amhurst Road, Hackney. *President*—William Rawlings. *Committee*—E. Farmer, W. Fenton-Jones, L. S. Wilks, F. E. Koofe, G. A. Avent, Dr. Burton, F. W. Gosling, A. C. Cooke. *Lanternist*—H. W. Dunkley. *Curator*—G. Parks. *Excursion Secretary*—S. C. Stean. *Treasurer*—W. L. Barker. *Secretary*—W. Selfe, 70 Paragon Road Hackney, N.E. *Assistant Secretary*—A. D. Fort.

J. LANCASTER & SON, Birmingham.

Nearly Half a Million Lancaster Lenses are now in use in every Country in the World.

FOR PARTICULARS AND PRICES SEE PAGES 487 TO 550.

Halifax Camera Club.—(REORGANISED 1895.)—Meetings held at the Studio, 29 Northgate. *President*—J. I. Learoyd. *Vice-Presidents*—G. R. Ryley, G. H. Hodgson, C. Rhodes, A. Priestly, C. Thomas, J. W. Pilling, J. W. Holland, H. Mortimer, T. Illingworth. *Committee*—C. Foster, E. Crowther, H. Kitson, I. Peel, H. Lightowler, J. Abbey, W. Bonner, R. Stocks, E. Laughton. *Caretaker*—J. H. Hanson. *Secretary and Treasurer*—Lionel Dickinson, 3 Livingstone Street, Lee Mount, Halifax.

Haltwhistle and District Photographic Society.—(ESTABLISHED 1889.)—Meetings are held at Haltwhistle. *President*—Dr. W. R. Speirs. *Vice-President*—Major Anne. *Secretary and Treasurer*—David Macadam London City and District Bank, Haltwhistle.

Hand Camera Portfolio Club.—(ESTABLISHED 1898.)—A Postal Club devoted to Hand Camera work. *Hon. Secretary*—Surgeon-Major Adcock, M.D., 1 Queen's Parade, Bath.

Handsworth Photographic Society.—(ESTABLISHED 1894.)—Meetings held at 111 Soho Road. *President*—Philip Whitehouse. *Vice-Presidents*—W. J. Foster, L.R.C.P., E. F. Freeland, C. J. Jarvis, W. J. Morgan. *Committee*—G. Allen, E. G. Collins, H. W. Goulding, E. Marlow, E. A. W. Moore, G. Owen, T. D. Thomas, G. Thompson. *Treasurer*—W. J. Bore. *Secretary*—A. E. Teague, 51 Linwood Road.

Hand Camera Postal Club.—(ESTABLISHED 1897.)—A circulating portfolio of artistic hand camera pictures. Only advanced workers of the hand camera are eligible for membership, and specimens of work should accompany all applications for admission. *Secretary and Treasurer*—George V. Myatt, Mount Pleasant House, Leek, Staffordshire.

Hastings and St. Leonards Photographic Society.—(Affiliated to the Royal Photographic Society.)—ESTABLISHED 1888.)—*President*—G. G. Grav, J.P., LL.D., F.R.G.S., F.R.H.S., F.L.S., F.S.A., &c. *Vice-Presidents*—J. H. Blomfield, A. Brooker, Dr. G. Locke, Rev. A. M. Macdonald, W. Stubbs, J.P., Ald. F. Tuppenney, J.P., Major Freeman-Thomas, M.P., J.P., Lord Brassey, K.C.B. *Council*—R. White Ford, J.P., J. F. Mastin, J. Smith, A. M. Apel, A. F. Watson. *Hon. Treasurer*—W. M. Simpson, *Hon. Secretary*—Fred Judge, 21a Wellington Place, Hastings.

Herefordshire Photographic Society.—(ESTABLISHED 1887.)—Meetings held at Clarence House, West Street, Hereford. *President*—Alfred Watkins. *Vice-Presidents*—T. J. Salway, J. Parker, W. J. Humphrys, H. H. Parry. *Committee*—A. C. Slatter, A. C. Edwards, W. W. Robinson, E. H. Matthews, W. Roberts. *Treasurer*—W. E. Haines. *Secretary*—Cecil Gethen, 9 St. Nicholas Street, Hereford.

J. LANCASTER & SON, Birmingham.

Over 320,000 Lancaster Cameras are in daily use
all over the Globe.

FOR PARTICULARS AND PRICES SEE PAGES 487 TO 550.

Hillsbro' (Sheffield) and District Photographic Society.—Meetings held at Makins School, Hillsbro'. *President*—George Neale. *Vice-Presidents*—B. Lancaster, E. Peace, W. Hopkinson. *Committee*—A. Hallam, G. Glover, G. R. Turner, A. Drake, W. Bland, W. Clarke. *Treasurer*—H. Huntley. *Reporter*—M. Williamson. *Secretary*—W. T. Furniss, 256 Langsett Road, Sheffield.

Holmfirth Photographic Society.—(Federated with the Yorkshire Photographic Union).—(ESTABLISHED 1901).—Meetings held at Holmfirth Technical Institute. *President*—Dr. Williams. *Vice-Presidents*—Miss Burt, Captain Jessop, Dr. Watthews, Messrs. J. T. Taylor, J.P., A. H. Wood, F. Greenwood, J. E. Woodhead, Heastie. *Committee*—Mrs. Copley, H. Crossley, J. F. Copley, J. R. Hogley, F. Bamforth. *Hon. Lanternist*—Frank Bamforth. *Hon. Treasurer*—Wm. Brown. *Hon. Secretary*—Geo. Holdsworth, Dean Bridge, Holmfirth.

Hove Camera Club.—(ESTABLISHED 1891).—Meetings held at the Town Hall, Hove. *President*—Alderman J. Colman, J.P. *Vice-Presidents*—W. A. Hounsom, J.P., Chas. Job, F.R.P.S., E. E. Manwaring, M.R.C.S.E., L.R.C.P.L., W. Clarkson Wallis, Alderman G. B. Woodruff, J.P. *Committee*—W. A. Ford, H. S. Gilkes, F. R. Richardson, D. J. Gadsby, C. Berrington-Stoner, R. C. Ryan. *Treasurer*—R. C. Foskett. *Hon. Secretary*—A. R. Sargeant, 55 The Drive, Hove.

Huddersfield Naturalist and Photographic Society.—(ESTABLISHED 1850).—Meetings held at the Technical College, Queen Street South, Huddersfield. *President*—John Cook. *Vice-Presidents*—H. G. Brierley and T. W. Woodhead, F.L.S. *Committee*—Mrs. H. G. Brierley, W. A. Bevers, A. Houghton, A. E. Baldick, T. H. Bartlam, A. W. Whiteley, H. W. Revell, A. Aspinall. *Treasurer*—Miss A. M. Sikes. *Secretaries*—W. E. L. Wattam (General) and W. H. Houghton (Photographic).

Hull Photographic Society.—(ESTABLISHED 1884).—Meetings held at the Society's Rooms, Grey Street, Hull. *President*—Major R. Ethelbert Johnson. *Vice-Presidents*—F. Atkinson and W. S. Parrish. *Committee*—W. J. Williams, W. Dalton, W. Gilleard, J. Hollingworth, M.R.C.S., J. W. Atkinson, F. Woollons, G. H. Strong, J. Pybus, T. J. Hards, R. W. Berry, Rev. W. Hay Pea, M.A. *Treasurer*—W. R. Nowell. *Secretary*—Albert E. Hindson, 6, Freehold Street, Hull.

Hyde Photographic Association.—(ESTABLISHED 1901).—Meetings held at the Rooms, Simpson Street, Hyde. *Council*—W. Allan Dew, W. Snelson, J. B. Torkington. *Secretary*—Wm. H. Middleton, 22 Knott Fold, Hyde.

Idlers' Camera Club.—(ESTABLISHED 1899).—Meetings held at 12 Freemantle Square. *President*—Charles Harry. *Committee*—G. Mallett, W. V. Collett, E. J. Dymont, E. S. Spurrier, H. W. Hobbart, F. R. Lewis, R. Hulme. *Treasurer and Secretary*—Arthur F. Vizor Collett, 52, Belmont Road, Montpelier, Bristol.

J. LANCASTER & SON, Birmingham.

Nearly Half a Million Lancaster Lenses are now in use in every Country in the World.

FOR PARTICULARS AND PRICES SEE PAGES 487 TO 550.

Ipswich Scientific Society (Photographic Section).—(ESTABLISHED 1869.)—Meetings held at the Museum, Ipswich. *President*—W. E. Watkins. *Committee*—J. S. Corder, S. A. Notcutt, B.A., B.Sc., E. P. Ridley, F.G.S., Dr. G. Vincent, J. C. Wiggin, F. Woolnough, G. H. Hewetson, H. Miller. *Treasurer*—H. Miller. *Secretary*—Frank Woolnough, Museum, Ipswich.

Isle of Man Camera Club.—(Affiliated with the Royal Photographic Society.)—(FOUNDED 1901.)—Meetings held in the Club Room, 75 Buck's Road, Douglas. *President*—Rev. H. Mudie Draper. *Vice-Presidents*—Rev. W. N. Watson and F. J. Johnson. *Committee*—Andrew Craine, T. S. Qualtrough, J. J. Frowde, W. Stephen Weigh. *Hon. Treasurer*—F. J. Johnson. *Hon. Secretary*—W. H. Skillicorn, "The Moorings," 3 Kensington Road, Douglas.

Isle of Thanet Photographic Society.—(Affiliated with the Royal Photographic Society.)—(ESTABLISHED 1888.)—Meetings held at St. George's Church Club, Broad Street. *President*—Rev. L. J. White-Thomson, M.A. *Vice-Presidents*—C. E. Eastgate, J. H. Forwalk, G. F. Blower, Dr. A. Rowe, P. Solly. *Committee*—Messrs. Deacon, Hoile, Savage, Simmers, Vigar, Weeks. *Hon. Lanternist*—P. F. Weeks. *Hon. Assistant Lanternist*—E. Deacon. *Delegate to the Royal Photographic Society*—J. C. Goldsack. *Hon. Secretary and Treasurer*—J. C. Goldsack—"Llanberis," Grove Road, Ramsgate.

Isle of Wight Photographic Society. Meetings held at the Masonic Hall, Newport, I.W. *President*—Prof. J. Milne, F.R.S., F.G.S., &c. *Vice-Presidents*—T. B. H. Cochrane, J.P., D.L. Major J. B. Seely, D.S.Q., M.P., Col. R. V. Malden, F.R.P.S., Edward Wilson, F. T. Mew, J.P. *Committee*—W. L. Bright, S. J. Groundsell, L. Jordan, A. Millidge, F. Cooper, F. Morgan, W. Jolliffe, E. A. Swane, S. Wright. *Treasurer*—W. W. Odell. *Secretary*—J. Howard Burgess, 53 Pyle Street, Newport, I.W.

Jersey Photographic Society.—(ESTABLISHED 1901.)—Meetings held at Beresford Café, Beresford Street. *President*—Dr. A. C. Stamberg. *Vice-President*—C. R. Poingdestre. *Treasurer and Secretary*—R. Porter, Brighton Villa, Brighton Road, Jersey.

Keighley and District Photographic Association.—(Federated with the Yorkshire Photographic Union.)—(ESTABLISHED 1889.)—Meetings held at the Mechanics' Institute, Keighley. *President*—W. Tate. *Vice-Presidents*—T. Heaps, M. Houghton, Alex. Keighley, F.R.P.S., J. W. Mitchell, W. Robertshaw. *Committee*—S. Bairstow, J. H. Bentley, J. Gill, F. Mahony, W. Mitchell, J. Moon, E. Myers, T. A. Smith. *Lanternist*—W. H. Hainsworth. *Librarian*—F. Gill. *Treasurer*—B. P. Heaton. *Secretaries*—C. H. Smith, 110 Devonshire Street, Keighley, and H. E. Haggas, 33 Devonshire Street, Keighley.

J. LANCASTER & SON, Birmingham.

Over 320,000 Lancaster Cameras are in daily use
all over the Globe.

FOR PARTICULARS AND PRICES SEE PAGES 487 TO 550.

Kendal Literary and Scientific Institution (Photographic Section).—*President*—Gilbert Gilkes. *Vice-Presidents*—F. W. Crewdson and T. Sharpe. *Hon. Secretary and Treasurer*—F. E. Cutts.

Kennaway Photographic Society (in connection with the Kennaway Association).—(ESTABLISHED 1900)—Meetings held at C. M. House, 16 Salisbury Square, London, E.C. *Patron*—Right Hon. Sir John H. Kennaway, Bart., M.P. *President*—Rev. Prebendary H. E. Fox, M.A. *Treasurer*—Charles Strong. *Secretary*—Wm. R. C. Cooke, C. M. House, 16 Salisbury Square, London, E.C.

Kilmarnock Camera Club.—*President*—R. M. Kellie. *Vice-President*—Rev. J. S. Cuthill, B.D. *Committee*—H. Wilson, G. Reid, J. Walter, D. Dick, T. H. Milloy. *Treasurer*—T. Bunten. *Secretary*—A. Manners, 65 Dundonald Road, Kilmarnock.

King's Lynn Photographic Society.—(ESTABLISHED 1893.)—*President*—S. A. Gurney. *Treasurer*—H. Tilson. *Secretary*—W. E. Daw, Hunstanton King's Lynn.

Kingston-on-Thames and District Photographic Society.—(ESTABLISHED 1893.)—Meetings held at the Sun Hotel, Market Place, Kingston-on-Thames. *President*—Rev. G. I. Swinnerton, M.A. *Vice-Presidents*—Dr. Finny, Albert Hill, Rev F. C. Lambert, M.A., Dr. Luscombe, Dr. Munyard, W. E. Price, A.M.I.C.E., W. Montague Robertson, Geo. Sanders, J.P., A. Vandendriesche. *Committee*—H. C. Fox, W. F. J. Hodgson, H. M. C. Sprunt, W. R. Stretton, T. W. Wilson. *Hon. Treasurer*—W. Montague Robertson. *Hon. Secretaries*: John F. East, Uxbridge House, Kingston-on-Thames, and A. W. Grant, "Woodleigh," Cranes Park Avenue, Surbiton.

Kirkcaldy Photographic Society.—(ESTABLISHED 1898.)—Meetings held at 196 High Street, Kirkcaldy. *President*—A. B. Young. *Vice-President*—Alex. Purves. *Council*—D. Storrar, J. G. Hardie, H. P. Thomson, Jas. Milne, D. Landale, Wm. Lockhart. *Treasurer*—Chas. Stewart. *Secretary*—S. Stewart, 2 Salisbury Street, Kirkcaldy.

Lancaster Photographic Society.—(ESTABLISHED 1889.)—Meetings held at the Society's Rooms, Stonewell. *President*—Neville Holden. *Vice-Presidents*—A. S. Barling and W. Briggs. *Committee*—R. W. Wearing, J. W. Pickard, J. B. Briggs, J. Parkinson, J. H. Parker, T. Baines. *Treasurer*—C. D. Baxandall. *Secretary*—R. T. Simpson, 21 Cheapside, Lancaster.

Lantern Slide Exchange Club.—(ESTABLISHED 1889.)—*Secretary and Treasurer*—J. S. Hawker, Mutley House, Plymouth.

J. LANCASTER & SON, Birmingham.

Nearly Half a Million Lancaster Lenses are now
in use in every Country in the World.

FOR PARTICULARS AND PRICES SEE PAGES 487 TO 550.

Leeds Camera Club.—(ESTABLISHED 1893)—Meetings held at the Athenæum, 9 Park Lane. *President*—Charles B. Howdill, A.R.I.B.A. *Vice-Presidents*—Rev. T. Arthur Curties, W. Emmott, A. Homburg, I. Howe, F. Rust. *Hon. Members*—R. Child Bayley, R. Bourke, A. Horsley Hinton, W. Thomas, W. Edwin Tindall, R.B.A. *Committee*—C. H. Allanson, T. Gascoigne, W. Handley, H. Milner, J. Mackenzie, W. Tebbs, H. Wormald, W. Yewdall. *Hon. Lanternist*—H. Wormald. *Assistant*—Wm. Abbott. *Hon. Treasurer*—J. H. E. Radcliffe. *Hon. Secretary*—F. G. Issott, 62 Compton Road, Harehills.

Leeds Photographic Society.—(ESTABLISHED 1852.)—Meetings held at the Philosophical Hall, Leeds. *President*—J. W. Addyman, B.A. *Vice-Presidents*—Godfrey Bingley and B. A. Burrell, F.I.C. *Committee*—A. W. Atkinson, H. Adams, J. Croisdale Coultas, M. Morfitt, A. Nicholson, Gilbert Middleton, Jas. Taylor, L.D.S. *Treasurer*—T. Carter. *Secretary*—R. Mackay, 1 The Terrace, Woodhouse Lane, Leeds.

Leicester and Leicestershire Photographic Society.—(ESTABLISHED 1885.)—Meetings held at the Memorial Hall, New Walk. *President*—R. Warden Harvey. *Vice-President*—Thomas Brown. *Committee*—G. Bankart, A. Bailey, T. Brown, J. S. Winn. *Treasurer*—Lewis Ough. *Secretary*—W. Murray, 60 Melton Road, Leicester.

Leicester Literary and Philosophic Society (Photographic Section)—(ESTABLISHED 1899.)—Meetings held at the Council Room, Town Museum. *Chairman*—H. Alfred Roechling, C.E., F.G.S., &c. *Vice-Chairman*—J. Parritt. *Treasurer and Secretary*—G. Owston Marshall, "Carisbrooke," Victoria Road, Leicester.

Leigh Photographic Society.—(ESTABLISHED 1892.)—Meetings held at Market Buildings, Leigh. *President*—Dr. H. S. Hall. *Vice-Presidents*—W. Hampson, Dr. J. Jones, R. Leigh, T. Lee Syms. *Committee*—C. Bruce, J. Berry, W. R. Moore, A. Preston, A. Sims, Jas. Smith. *Hon. Lanternist*—P. Seddon. *Treasurer*—T. Haddock. *Secretary*—T. Mercer, 2 Clarence Street, Leigh, Lancs.

Leith Amateur Photographic Association.—(ESTABLISHED 1883.)—Meetings held at Wilson's Hall, Hope Street, Leith. *President*—Thomas Wilson. *Vice-President*—William Seater. *Council*—Jas. Taylor and Jas. Hayes. *Treasurer*—Murdoch Campbell. *Secretary*—Wm Duncan, Solicitor, 36 Charlotte Street, Leith.

Llandudno Camera Club and Lantern Society.—(ESTABLISHED 1892.)—*President*—Lord Mostyn, *Secretary*—A. E. Deacon, Gloddaeth Street Llandudno.

J. LANCASTER & SON, Birmingham.

Over 320,000 Lancaster Cameras are in daily use
all over the Globe.

FOR PARTICULARS AND PRICES SEE PAGES 487 TO 550.

Light and Truth Postal Photographic Club.—(ESTABLISHED 1890.)—
Treasurer and Secretary—George Harry Haycox, St. Dunstan's
Crescent, Worcester.

Liverpool Amateur Photographic Association.—(ESTABLISHED 1863.)—
Meetings held at Percy Buildings, Eberle Street, Liverpool. *President*
—E. Rimbault Dibdin. *Vice-Presidents*—Dr. T. W. A. Napier and
F. A. Schierwater. *Trustees*—Paul Lange, H. Lupton, J. H. Welch.
Council—Dr. C. Thurstan Holland, W. A. Taylor, T. E. Corney,
Wilson, W. B. Hellon, J. Marples, Wm. Harvey, J. Parkinson, R. F.
Soper, G. B. Newton, J. Sirett Brown, Dr. Llewellyn Morgan, J.
Earp, Dr. J. W. Ellis, Fred Anyon, H. Holt. *Treasurer*—P. H. Phillips.
Secretary—Edwin Simnett, Percy Buildings, Eberle Street, Liverpool.

Liverpool Central Y.M.C.A. Camera Club.—(ESTABLISHED 1880.)—Meet-
ings held at Mount Pleasant, Liverpool. *President*—Richard Brown
Committee—A. Bryning, George Coleburn, F. O. Cresswell, J. M.
Dow, J. Henderson, F. Moreland. *Hon. Secretary and Treasurer*—
R. A. Croston, 44 Osborne Road, Tuebrook, Liverpool.

Liverpool University College.—(ESTABLISHED 1898.)—Meetings held at
University College, Liverpool. *President*—J. F. Spencer, B.Sc. *Vice-*
Presidents—T. L. Bailey, Ph.D. and A. W. Titherley, D.Sc., Ph.D.
Committee—Messrs. Hope, Baty, Holt. *Treasurer*—F. A. Freeth.
Secretary—W. L. Hicks, University College, Liverpool.

London and Provincial Photographic Association.—(ESTABLISHED 1882.)
—Meetings held at the "White Swan," Tudor Street, Whitefriars, E.C.
Trustees—Thos. E. Freshwater and A. Haddon. *Committee*—R.
Beckett, R. P. Drage, T. K. Grant, J. W. Hodges, R. J. Kindon,
W. J. Marshall, H. C. Rapson, J. S. Teape. *Hon. Secretary and*
Treasurer—Walter D. Welford, Warwick Lodge, 166 Romford Road, E

Longton and District Photographic Society.—(ESTABLISHED 1894.)—Meet-
ings held at Sutherland Institute. *President*—Dr. A. Parkes, J.P.
Vice-Presidents—Ald. C. Bennion, C.C., Mayor, Alderman A. Edwards,
J.P., Ex-Mayor, Dr. W. J. Dawes, J.P., M.O.H., Councillor E.
Brookfield, J.P., A. B. Jones, J.P., Councillor P. H. Bennion, H.
Barrett Greene, W. Mountford, Major Moore, Dr. J. W. Dawes, Rev.
C. F. L. Barnwell, A. W. Allin. *Committee*—J. L. Mountford, J. Toft,
J. Bold, Dr. J. T. H. Croft, F. Chapman, T. Lawrence, T. H. Manley.
Hon. Treasurer—S. Ashcroft. *Hon. Secretary*—T. Mottershead,
43 Stafford Street, Longton, Staffs.

J. LANCASTER & SON, Birmingham.

Nearly Half a Million Lancaster Lenses are now in use in every Country in the World.

FOR PARTICULARS AND PRICES SEE PAGES 487 TO 550.

Louth and District Photographic Society.—(ESTABLISHED 1890.)—Meetings held at 8 Ugate, Louth, Lincolnshire. *President*—Rev. J. Edward Standen, M.A. *Vice-President*—F. J. Ingoldby. *Committee*—S. F. Clarke, O. Burditt, W. Shephard, A. Ingoldby, G. Godsmark, A. Plaskitt. *Treasurer*—H. S. Forman. *Secretary (acting)*—Rev. J. Edward Standen, M.A., 4 South Street, Louth, Lincolnshire.

Ludlow Photographic Society.—*President*—W. Hurt Sitwell. *Hon. Treasurer*—G. E. Davis. *Hon. Secretary*—Tilsley Price.

Luton Camera Club.—(ESTABLISHED 1898.)—Meetings held at 72 George Street, Luton. *President*—W. G. P. Warren. *Vice-Presidents*—W. Dandy and J. R. Marsh. *Committee*—A. Strange, H. Fullarton, W. J. R. Eads, H. Deacon, J. L. Bailey, H. J. Sell. *Hon. Lecturer*—G. Wistow Walker. *Treasurer*—H. E. Cocker, M.P.S. *Secretary and Lanternist*—Edward J. Bradley, 4 Collingdon Street, Luton.

Lyonsdown Amateur Photographic Association.—(ESTABLISHED 1886.)—Meetings held at members' houses. *Committee*—A. Bentley (Chairman), F. Crosbie, W. Crosbie, H. York, Rev. J. A. Davies, F. J. Martin, I. Marchand, A. J. Oldis, T. Bishop, W. Roughton, W. Gabell, F. Ford, J. J. Adams, C. A. S. Koch. *Treasurer*—Walter Crosbie. *Secretary*—Frank J. Martin, Northdene, New Barnet.

Manchester Amateur Photographic Society.—(ESTABLISHED 1835.)—Monthly meetings held at the Manchester Athenæum. *President*—Rev. Henry W. Dick. *Vice-Presidents*—S. L. Coulthurst, J. W. Wade, Geo. H. B. Wheeler. *General Committee*—W. H. Bowman, F. W. Burton, J. Collinge, T. L. Cooper, C. J. Harrison, Max Mensch, J. W. Price, P. Rowe, L. Scholes, Jas. Sharv, J. Wood Smith, J. W. Young. *Sub-Committees*—Record: W. H. Bowman, Max Mensch, J. Wood Smith, J. W. Wade, P. Rowe (Hon. Sec.); Society's Rooms: J. Collinge, S. L. Coulthurst, L. Scholes, Geo. H. B. Wheeler, C. J. Wheeler, C. J. Harrison and Jas. Shaw (joint Hon. Secs.); Lantern: F. W. Burton, T. L. Cooper, J. W. Price, P. Rowe, L. Scholes; Postal Club: C. J. Harrison, J. W. Price, J. W. Young, T. L. Cooper (Hon. Sec.). The President and Secretary are *ex-officio* members of all sub-committees. *Librarian*—J. W. Young. *Editor of Magazine*—J. Wood Smith. *Hon. Treasurer*—Chas. Dawson. *Secretary*—F. W. Parrott, 3 Elm Road, Altrincham.

Manchester Camera Club.—(ESTABLISHED 1883.)—*Committee*—W. A. Hepburn; F. T. Overmann, J. W. Wade. *Secretary*—Chas. Dawson, 10 Chepstow Street, Manchester.

Manchester Photographic Society.—(ESTABLISHED 1855.)—Meetings held at the Chamber of Commerce Rooms, 44 Mosley Street. *President*—Hermann Woolley. *Vice-Presidents*—Abel Heywood, W. B. Wood, W. E. Wood. *Committee*—B. J. Beckton, J. T. Chapman, T. Chilton, W. Galloway, W. Rivers, J. Whittaker. *Treasurer*—W. G. Coote. *Secretary*—C. H. Coote, 10 Holmefield, Sale, near Manchester.

J. LANCASTER & SON, Birmingham.

Over 320,000 Lancaster Cameras are in daily use
all over the Globe.

FOR PARTICULARS AND PRICES SEE PAGES 487 TO 550.

Manchester Y.M.C.A. Photographic Club.—(ESTABLISHED 1890).—Meetings held at the Y.M.C.A., 56 Peter Street, Manchester. *President*—G. T. White. *Vice-Presidents*—A. C. Harrison, W. H. Machin, W. H. Cheetham. *Committee*—Geo. Dixon, H. Whitham, A. T. Howarth, J. D'Ewart, H. C. Dumler, W. Pett, B. Gandy. *Treasurer*—S. Ford Smith. *Secretary*—J. W. Price, 56 Peter Street, Manchester.

Mansfield Camera Club (Late Mansfield and District Amateur Photographic Club).—(ESTABLISHED 1898).—Meetings held at the Oriental Café, West Gate, Mansfield. *President*—Alderman H. J. Patterson. *Committee*—Miss Heane, A. Buxton, J. T. Cook, H. Pye, J. W. Hudson, Dr. Palmer, G. A. Longden, P. J. Fenwick. *Hon. Lanternist*—J. A. Pegg. *Hon. Treasurer*—H. Alcock. *Hon. Secretary*—A. Adlington, Care of Oriental Café, West Gate, Mansfield.

Marple and District Photographic Society.—Meetings held at the Recreation Club, Church Lane, Marple. *President*—C. J. Atkinson. *Committee*—F. Allen, B. Fielding, S. R. Hilton, B. Leech, J. S. Atkinson, A. Gee, B. Ingleby, J. W. Wood. *Hon. Treasurer*—J. B. Hope. *Hon. Secretary*—C. Taylor, Oak Lee, Longhurst Lane, Mellor, near Stockport. *Minute Secretary*—Frank Allen, Sunny Bank, Marple.

Mid-Cheshire Society of Art.—(ESTABLISHED 1895).—Meetings are held at the Society's Rooms, Castle, Northwich. *President*—Thomas Arthur Johnson. *Committee*—George B. Cliff, J.P., J. Hardie, H. J. Reid, E. P. Ward, H. Yeomans. *Secretary and Treasurer*—George Holland, 17 Stanley Mount, Nursery Road, Barnton, near Northwich, Cheshire.

Midland Camera Club.—(ESTABLISHED 1891).—*President*—H. R. Leech, M.D., M.R.C.S., J.P. *Vice-Presidents*—Hall-Edwards, L.R.C.P., Councillor Lancaster, C. Jevons Fowler. *Committee*—T. H. Cox, William Dudley, M.R.C.S., T. Smallwood, C. J. Perry. *Treasurer*—R. J. Bailey. *Secretary*—Howard Cooper, 19 Bearwood Road, Smethwick.

Midlothian Camera Club.—(ESTABLISHED 1889).—Meetings held at 61 Leith Walk, Leith. *President*—Thomas Wilson. *Vice-President*—Rev. Wm. Burnett. *Treasurer*—R. C. Ewart. *Secretary*—George Cleland, Bank of Scotland, 61 Leith Walk, Leith.

Monklands (Airdrie) Photographic Society.—Meetings held at the Club Room, Victoria Place, Airdrie. *President*—W. D. Gray. *Vice-President*—James Jack. *Council*—T. A. Deas, J. W. Eadie, W. B. Hossack, J. Hogg, jun., J. McGovern, H. Loudon. *Secretary and Treasurer*—J. Hugginson, 139 Graham Street, Airdrie, N.B.

J. LANCASTER & SON, Birmingham.

Nearly Half a Million Lancaster Lenses are now
in use in every Country in the World.

FOR PARTICULARS AND PRICES SEE PAGES 487 TO 550.

National Photographic Record Association.—(ESTABLISHED 1897.)—

President—Sir J. Benjamin Stone, M.P. *Council*—Right Hon. the Earl of Crawford, Sir E. M. Thompson, Sir H. T. Wood, H. Baker, C. E. Fagan, L. Fletcher, St. John Hope, B. E. Lawrence, A. Mackie, J. W. Marchant, Dr. Mill, R. Nevill, P. Norman, J. Thomson, H. S. Ward, Mrs. Ward, H. B. Wheatley, A. V. Haslam, Horsley Hinton, G. Middleton. *Treasurer*—Alexander Graham. *Secretary*—George Scamell, 21 Avenue Road, Highgate.

Newcastle-on-Tyne and Northern Counties Photographic Association.—

(ESTABLISHED 1881.)—Meetings held at the Y.M.C.A., Newcastle-on-Tyne. *President*—W. Errington Cowan. *Vice-Presidents*—W. Corder, J.P., J. S. B. Bell, C.E., T. M. Clague, C. E. Barkas. *Council*—G. Hastings, W. Scutt, Jas. Baty, W. Datchin, A. B. Gardener, Wm. Thompson, T. Bulman, J. P. Gibson, J. M. Gibson, John Watson. *Treasurer*—Alexander Marshall. *Secretaries*—J. Hume Harbottle, 5 Bentick Crescent, Newcastle, and Frank Milburn, 41, Westmoreland Road, Newcastle.

Newton Heath Camera Club.—(ESTABLISHED 1894.)—Meetings held at the

Wesleyan School. *President*—W. Knowles. *Vice-Presidents*—C. P. Senior and J. Smith. *Committee*—W. T. Evans, H. J. Dean, G. P. Wood, J. Poole, F. Ogden, A. G. Thistleton. *Treasurer*—J. W. Cresswell. *Secretary*—J. Taylor, 103 Lightbowne Road, Moston, Manchester.

Northampton Natural History Society (Photographic Section).—(ESTABLISHED 1875.)—Meetings held at 1a Sucep Street, Northampton.

President—H. Manfield, Moulton Grange, Nortnants. *Committee*—G. Nichols, C. Law, J. J. Wetherell, E. Archer, E. J. H. Felce, G. E. Holt, W. J. Lewis. *Secretary*—C. H. Dorman, 51 Abington Street, Northampton.

North Middlesex Photographic Society.—(ESTABLISHED 1886.)—Meetings

held at Hanley Hall, Sparsholt Road, Crouch Hill, London, N. *President*—C. Beadle. *Vice-Presidents*—R. Child Bayley, F.R.P.S., and J. W. Marchant, F.R.P.S. *Council*—T. Barnard, D. H. W. Broad, L. J. Glendening, A. G. Lawson, A. H. Lisett, J. McIntosh, J. C. S. Mummery, F.R.P.S., H. Smith, C. R. Steele, H. Stuart, W. Taylor. *Treasurer*—F. M. Ainsley. *Secretary*—T. Pring, 16 Ravenstone Road, Hornsey, N.

North-West London Photographic Society.—(Affiliated to the Royal

Photographic Society.)—(ESTABLISHED 1901.)—Meetings are held at 168 Camden Street, Camden Town, N.W. *President*—W. Kilbey. *Vice-President*—A. R. Toplis. *Committee*—W. Beyer, W. A. Edgar, G. H. Carter, A. J. Reid, H. H. Morgan. *Delegates to the Royal Photographic Society*—Messrs. Reid and Kilbey. *Hon. Treasurer*—R. E. Winkworth. *Hon. Secretary*—H. Date, 271 Kentish Town Road, N.W. *Assistant Secretary*—J. Fairfoull.

J. LANCASTER & SON, Birmingham.

Over 320,000 Lancaster Cameras are in daily use
all over the Globe.

FOR PARTICULARS AND PRICES SEE PAGES 487 TO 550.

Nottingham Mechanics Institution Camera Club.—*President*—The Duke of Newcastle. *Vice-Presidents*—Lord Henry Bentinck, M.P., Edward Bond, M.P., J. H. Yoxall, M.P., Col. Sir Charles Seely, W. J. Abel, S. Bourne, A. Brown, F. N. Ellis, A. Pyatt, G. H. Wallis, C. B. Wright, H. Tolley. *Committee*—A. W. Flowerdew, T. Wright, T. K. Gordon, A. Black, J. Anderson, W. R. Anderson, P. W. Crane, E. H. Atkin. *Curator of Survey Prints*—J. M. Radford. *Album and Slide Secretary*—A. R. Hartley. *Hon. Secretary and Treasurer*—W. Ward, 14 Stratford Terrace, Nottingham.

Oldham Photographic Society.—(ESTABLISHED 1867.)—Meetings held at 13a Manchester Street, Oldham. *President and Treasurer*—J. Whitehead. *Vice-President*—T. Burton. *Council*—James Hall, J. P. Robinson, Wm. Taylor, T. W. Hilton, Saml. Holroyd, T. Widdop. *Librarian*—J. Fullalove. *Honorary Secretary*—Spencer Ashton, 41 Waterloo Street, Oldham.

Oxford Camera Club.—(ESTABLISHED 1894.)—Meetings held at the University Museum. *President*—Sir W. J. Herschel, Bart. *Vice-Presidents*—Miss Acland, Miss Venables, Colonel Impey, Claude Rippon. *Committee*—E. A. Bevers, E. C. H. Jessop, H. T. Leach, H. Minn, Rev. W. M. Merry, A. Robinson, G. Shelton. *Treasurer*—R. A. R. Bennett. *Secretary*—G. W. Norton, 149 Woodstock Road, Oxford.

Paisley Philosophical Institution (Photographic Section).—ESTABLISHED 1857.)—Meetings held at 28 Oakshaw Street, Paisley. *President*—David B. Jack. *Vice-President*—T. H. Taylor, L.D.S. *Treasurer*—Thos. Reid, jun. *Secretary*—Robert Milne, Savings Bank, Johnstone

Peterborough Photographic Society.—(ESTABLISHED 1887.)—Meetings held at the Bedford Temperance Hotel. *President*—Dr. G. Kirkwood. *Vice-Presidents*—Dr. T. J. Walker, J.P., E. Worthington, G. W. Leigh, T. W. Rogers, A. C. Taylor. *Committee*—J. F. Perkins, A. W. Nicholls, W. H. Pentney, W. Atkinson, W. Johnson. *Hon. Treasurer*—H. C. Lilley. *Hon. Secretary*—T. J. Calcutt, 46 Narrow Street.

Photographic Club.—(ESTABLISHED 1897.)—Meetings held at Anderton's Hotel, Fleet Street, London, E.C. *Trustees*—F. A. Bridge and H. Snowdon Ward. *Committee*—G. E. Brown, A. Mackie, J. W. Mason, W. R. Stretton, H. P. Smith, Chas. Wallis, G. Wynne, J. W. Zaehnsdorf. *Hon. Librarian*—Hans Müller. *Hon. Secretary and Treasurer*—T. W. Derrington, 85 Trinity Road, Wimbledon.

Photographic Copyright Union.—*President*—Frank Bishop. *Vice-President*—Joseph J. Elliott. *Committee*—J. Lillie Mitchell (Hon. Secretary), Warwick Brookes, Wm. Downey, Alfred Ellis, W. Magrath, Frank M. Sutcliffe. *Solicitors*—Neish, Howell & Haldane. *Treasurer*—Wm. Grove. *Secretary*—Henry Gover, London Chamber of Commerce, Botolph House, Eastcheap, E.C.

J. LANCASTER & SON, Birmingham.

Nearly Half a Million Lancaster Lenses are now in use in every Country in the World.

FOR PARTICULARS AND PRICES SEE PAGES 487 TO 550.

Photographic Convention of the United Kingdom.—(ESTABLISHED 1886.)

—The Eighteenth Annual Meeting will be held at Perth, in July, 1903, under the Presidency of Sir Robert Pullar. Retiring President (Cambridge, 1902), Sir Robert S. Ball. The Photographic Convention was founded for the advancement of Photography, and to afford opportunities for personal intercourse and exchange of ideas amongst those interested in the art. Meetings have been held at the following centres:—Derby, Glasgow, Birmingham, London, Chester, Bath, Edinburgh, Plymouth, Dublin, Shrewsbury, Leeds, Great Yarmouth, Glasgow (second visit), Gloucester, Newcastle-on-Tyne, Oxford, and Cambridge. *Past Presidents*—J. Traill Taylor, Andrew Pringle, C. H. Bothamley, George Davison, William Bedford, George Mason, Sir Howard Grubb, A. Haddon, H. P. Robinson, F. P. Cembrano, John Stuart, W. Crooke, Thos. Bedding, Sir W. J. Herschel, Bart. *Members of Council*—Dr. Bansall (Cambridge), H. Walter Barnett (London), Harold Baker (Birmingham), G. B. Bainbridge (Newcastle-on-Tyne), Godfrey Bingley (Leeds), W. J. Croall (Edinburgh), T. R. Dallmeyer (London), Dr. Dufton (Cambridge), R. W. Dugdale (Gloucester), W. E. Dunmore (London), Alfred Ellis (London), S. H. Fry (London), F. Gandy (Derby), J. Pattison Gibson (Hexham), H. M. Hastings (London), E. J. Humphrey (London), T. Illingworth (London), Sydney Keith (Hounslow), C. Phipps Lucas (London), Percy Lund (Bradford), Colonel Lysaght (Pretoria, S.A.), J. W. Marchant (London), A. F. Mowl (Liverpool), Rev. T. Perkins (Blandford), Claude Rippon (Oxford), Ralph Robinson (Redhill), P. R. Salmon (London), F. H. Sanderson (Cambridge), A. Seaman (Chesterfield), Alexander Tate (Belfast), W. Taylor (Leicester), G. H. Tyndall (Ely), J. H. Walker (Leeds), E. J. Wall (London), H. Snowdon Ward (London), Lieut.-Gen. J. Waterhouse, I.S.C. (London), S. B. Webber (London), G. Watmough Webster (Chester), J. B. B. Wellington (Elstree), A. Werner (Dublin), W. Thompson (Newcastle-on-Tyne), G. W. Norton (Oxford), and H. A. Chapman (Cambridge), are by Rule XII. *ex-officio* members of Council for one, two, and three years respectively. *Vice-Presidents* are by Rule X. members of Council *ex-officio*. *Trustees*—Samuel Blatchford Webber and Frederick Albert Bridge. *Hon. Secretary and Treasurer*—F. A. Bridge East Lodge, Dalston Lane, London, N.E.

Photographic Society of Ireland.—(ESTABLISHED 1854.)—Meetings held at

35 Dawson Street, Dublin. *President*—Prof. J. Joly, D.Sc., F.R.S. *Vice-Presidents*—Victor E. Smyth and A. M. Geddis. *Committee*—R. L. Bewley, Geo. E. Matthews, H. Pollock, H. V. Yeo, R. M. Inglis, J. H. Woodworth, J. Simpson, H. Goodwillie, W. H. Brayden, C. W. Pearson. *Treasurer*—Wm. Bewley, B.A. *Hon. Secretary*—E. Webb-Smith, 35 Dawson Street, Dublin. *Assistant Hon. Secretary*—W. F. Cooper.

MORGAN & KID

RICHMOND · LONDON · S.W.

Photographic Survey and Record of Surrey.—(ESTABLISHED 1902.)—

Meetings held at the Lecture Hall, Free Library, Town Hall, Croydon. *President*—The Right Hon. Viscount Midleton, Lord Lieutenant, County of Surrey. *Vice-Presidents*—M.P.'s and County Mayors of the County of Surrey. *Executive Committee*—W. Whitaker, B.A., F.R.S., F.G.S. (chairman), Hector Maclean, F.G.S., F.R.P.S., T. Bulbeck, J. W. Baldock, F.C.S., H. Keatley Moore, B.A., B.Mus., L. Stanley Jast (Curator), *Treasurer*—W. W. Topley. *Survey Secretary*—Harry D. Gower. *General Secretary*—J. M. Hobson, M.D., B.Sc., 1 Moorland Road, Croydon.

Photographic Survey of Warwickshire.—(ESTABLISHED 1890.)—*President*

—Sir J. Benjamin Stone, M.P. *Vice-President*—J. H. Pickard. *Committee*—Oliver Baker, A. J. Leeson, F. Lewis, B. Moore, T. Taylor. *Hon. Curator*—P. T. Deakin. *Treasurer*—G. F. Lyndon, J.P. *Secretary*—Geo. Whitehouse, 7, Wye Cliff Road, Handsworth.

Plumstead (All Saints') Photographic Society.—(ESTABLISHED 1896.)—

Meetings held at the Mission Hall, Herbert Road. *Chairman*—H. Clutterbuck, M.I.M.E., M.I.Mech.E. *Council*—C. Arnold, E. Kemp, W. Grant, A. D. Pritchard, C. Stone. *Secretary and Treasurer*—G. V. Taylor, 29 Vernham Road, Plumstead.

Plymouth Photographic Society.—(ESTABLISHED 1894.)—Meetings held

at the Athenæum, George Street. *President*—Charles H. Dymond. *Vice-Presidents*—Frederick Johnson and J. T. Johnson. *Committee*—C. F. Bowtell, W. Clayden, W. H. Harris, A. W. Hicks, H. S. Hill, W. C. Johns, F. H. Pearse, E. G. Turney. *Hon. Treasurer*—J. Trouern Trend. *Hon. Secretary*—Wilfred Grist, 105 Old Town Street, Plymouth.

Plympton Photographic Society.—(ESTABLISHED 1894.)—*President*—Dr.

Aldridge. *Committee*—Dr. Ellery, J. Brooking Rowe, C. H. Stevens, H. Tritton. *Secretary Treasurer and*—T. H. Wilks, Plympton House, Plympton, South Devon.

Polytechnic Photographic Society.—Meetings held at the Polytechnic,

Regent Street, W. *President*—Howard Farmer. *Vice-Presidents*—Frank Hastings and W. M. Weir. *Committee*—F. Bull, C. E. Crake, G. Goose, C. W. Belton, C. A. Pinnion, Ellis Williams. *Treasurer*—Rowland T. Hill. *Secretary*—Frank Wilson, 5 Balderton Buildings, Grosvenor Square, London, W.

Poole and Parkstone Natural History and Photographic Society.—(ESTABLISHED 1889.)—Meetings held at 142 High Street, Poole. *President*—

Dr. W. Hooper Masters. *Vice-Presidents*—W. Carter, Rev. T. Perkins, M.A., Dr. W. Conway Hine. *Committee* (Photographic Section)—Mr. Hunt, Dr. Durell, Rev. T. Perkins, A. D. Moullin. *Treasurer*—George Parry. *Secretary*—J. Robey Eldridge, 142 High Street, Poole, Dorset.

FOR BROMIDE PAPERS

INVENTORS AND STILL FIRST

- Postal Camera Club.**—(ESTABLISHED 1894.)—A circulating Club for advanced workers only. The portfolios circulate with regularity. Prints are inserted and withdrawn by the members as the portfolio arrives monthly. *Hon. Secretary*—W. R. Bland, Duffield, Derby.
- Postal Photographic Club.**—(ESTABLISHED 1886.)—*Hon. Secretary and Treasurer*—Reginald A. R. Bennett, M.A., Walton Manor Lodge, Oxford.
- Preston Scientific Society (Photographic Section).**—(ESTABLISHED 1896.)—Meetings held at 119a Fishergate. *Chairman*—W. Phillips. *Vice-Chairman*—J. G. Shaw. *Committee*—Messrs. Marsden, Burton, Croasdale, Turner, Entwistle, Norris. *Treasurer*—E. Myres. *Secretary*—A. W. Cooper, 31 Kenmure Place, Garstang Road, Preston.
- Professional Photographers' Association.**—(ESTABLISHED 1901.)—*President* William Grove. *Vice-Presidents*—H. Walter Barnett, W. Crooke, Ernest Elliott. *Committee*—Ten London Members: F. A. Bridge, H. J. Dalby, Alfred Ellis, H. Edmonds Hull, M. Jacolette, A. Mackie, Edgar Scamell, G. V. Simmons, Lang Sims, T. C. Turner; Ten Country Members: W. Barry (Hull), H. A. Chapman (Swansea), W. Gill (Colchester), Frank Moffatt (Edinburgh), G. W. Morgan (Aberdeen), H. C. Spink (Brighton), W. D. Valentine, J.P. (Dundee), G. Watmough Webster (Chester), H. J. Whitlock (Birmingham), Alfred Werner (Dublin). *Hon. Solicitor*—P. E. Marshall. *Bankers*—National Provincial Bank of England. *Hon. Treasurer*—William Grove. *Hon. Secretary*—Alfred Ellis, 51 Baker Street, London, W.
- Pudsey and District Photographic Society.**—*President*—Dr. W. L. Hunter. *Vice-President*—J. W. Golightley. *Committee*—G. B. Collins, W. Muff, S. Keighley, J. Way, J. Huggan, J. Taylor, W. S. Crowther, C. E. Whittam, *ex-officio*. *Hon. Lanternist*—J. Way. *Hon. Assistant Lanternist*—J. W. Scarth. *Hon. Treasurer*—J. R. Coulson. *Hon. Secretary*—Herbert A. H. Walker, Swinnow House, Pudsey, near Leeds.
- Queen's College, Belfast, Camera Club.**—(ESTABLISHED 1901.)—Meetings held at Students' Union, Queen's College. *President*—J. Wylie, B.A. *Vice-Presidents*—O. M. Praeger, M.B. and T. B. Vineycomb, M.A. *Committee*—J. W. Allen, W. Calwell, M.A., H. M. Johnston, B.A., J. S. O'Neill, W. Riddell, J. B. Williams. *Treasurer and Secretary*—A. E. Stewart Irvine, Students' Union, Queen's College, Belfast.
- Reading and District Photographic Society.**—Meetings held in Room at Abbey Gateway, Reading. *President*—Alfred Palmer, J.P. *Treasurer*—G. W. Webb. *Secretary*—C. A. Reading, Broadlands, Caversham Park, Reading.
- Redhill and District Camera Club.**—(ESTABLISHED 1899.)—Meetings held at Market Hall, Redhill. *President*—J. O. Grant. *Treasurer*—F. H. Ellwood, L.D.S. *Secretary*—H. J. Blackler, M.B., Braemfell, Redhill.

MORGAN & KID

RICHMOND · LONDON · S.W.

Richmond Camera Club.—(ESTABLISHED 1890.)—Meetings held at the Greyhound Hotel. *President*—F. P. Cembrano. *Vice-Presidents*—J. Ardaseer and Dr. Rodman. *Committee*—J. H. Alabaster, A. Cheese, H. Dale (Hon. Lanternist), J. D. Gibson, A. Hunter, jun., H. A. Wilson. *Treasurer*—J. B. Huddy. *Secretary*—E. G. Richardson, 13, Dynevor Road, Richmond, Surrey.

Ripon Portfolio Club.—(ESTABLISHED 1899.)—*Treasurer and Secretary*—H. Bulmer Rudd, 29 Westgate, Ripon.

Rishton and District Camera Club.—Meetings held over Miss Hothersall's Shop, 57 High Street, Rishton. *President*—Dr. Barr, J.P. *Vice-Presidents*—J. Whittaker, J.P., C.C., J. Hanson, J. [Cornall, T. Battersby, H. Halstead, Dr. Bowes, Albert Holt, W. Hothersall, Jas. Hacking, Coun. J. Marshall. *Committee*—G. Croft, W. Parker, W. Hothersall, S. Slater, S. Peel, R. Greenwood, H. Hollin, D. Coleman. *Lanternist*—Coun. J. Marshall. *Hon. Treasurer*—T. Battersby. *Hon. Secretary*—R. T. Kenyon, 1 High Street, Rishton.

Rochdale and District Photographic Society.—(ESTABLISHED 1890.)—Meetings held at the Baillie Street Board School, Rochdale. *Treasurer*—George W. Jones. *Secretary*—Wm. Bamford, 242 Yorkshire Street, Rochdale.

Rodley, Farsley and District Photographic Society.—(ESTABLISHED 1893.)—Meetings are held at Rodley, near Leeds. *President*—B. O. Pearson, J.P. *Vice-Presidents*—C. Gaunt G. W. Bentley. Rev. C. P. Morris, M.A. *Committee*—J. F. Ashby, J. W. Nicholson, John Ross. *Treasurer*—Harry Hardaker. *Secretary*—H. Crossley, Rodley, near Leeds.

Röntgen Society.—(ESTABLISHED 1896.)—Meetings held at 20 Hanover Square, W. *President*—Herbert Jackson, F.C.S. *Treasurer*—J. J. Vezey, F.R.P.S., F.M.S. *Secretary*—F. Harrison Low, M.B., &c., 2 Henrietta Street, Cavendish Square, W.

Rotherham Photographic Society.—*President*—E. Isle Hubbard, M.S.A. *Vice-Presidents*—J. Leadbeater, J. W. Stamp, W. Firth. *Council*—W. Mason, J. C. Cox, R. H. Law, A. S. Lyth, J. Caseldine. *Auditor*—J. Caseldine. *Hon. Treasurer*—F. Oldham. *Hon. Secretary*—H. C. Hemmingway, Tooker Road, Rotherham. *Assistant Hon. Secretary*—C. E. Davis.

Royal Cornwall Polytechnic Society.—(ESTABLISHED 1833.)—*Patron*—His Most Gracious Majesty the King. *Vice-Patron*—His Royal Highness the Prince of Wales, K.G. *President*—Sir William H. Preece, K.C.B., F.R.S. *Vice-Presidents*—Sir Walter Trevelyan, Bart., Rev. J. S. Flynn, B.D., Alfred Bache, Assoc. Inst. C.E., Thurstan C. Peter, The Lord Bishop of Truro, Principal A. W. Rucker, D.Sc., F.R.S., Sir Richard Tangey, F. J. Bowles, Prof. C. Le Neve Foster, D.Sc., F.R.S., Edmund Backhouse, W. Ayerst Ingram, R.B.A., John Gill, F.C.S. *Treasurer*—Robert Milford Tweedy. *Secretary*—Edward Kitto, The Observatory, Falmouth.

FOR ENLARGEMENTS BROMIDE-CARBON-PLATINOTYPE

Royal Photographic Society of Great Britain.—(ESTABLISHED 1853.)—Meetings held at 66 Russell Square, London, W.C. *Patrons*—Their Majesties the King and Queen. *Vice-Patrons*—T.R.H. the Prince and Princess of Wales. *President*—Thomas R. Dallmeyer, F.R.A.S. *Vice-Presidents*—Sir W. de W. Abney, K.C.B., D.C.L., F.R.S., F.R.A.S., The Right Hon. the Earl of Crawford, K.T., F.R.S., P. H. Emerson, B.A., M.B., Prof. Raphael Meldola, F.R.S. *Council*—H. Walter Barnett, Frank Bishop, James Cadett, C. H. Bothamley, F.I.C., F.C.S., St. Lawrence Carson, B.A., B.Sc., Walter L. Colls, Douglas English, B.A., Ernest C. Fincham, M.R.C.S., L.R.C.P., T. E. Freshwater, F.R.M.S., A. Haddon, Sir W. J. Herschel, Bart., F. Hollyer, G. Lindsay Johnson, M.A., M.D., E. B. Knobel, F.R.A.S., J. C. S. Mummery, Wilson Noble, E. Sanger Shepherd, Joseph W. Swan, M.A., F.R.S., Prof. W. C. Unwin, B.Sc., F.R.S., B. Gay Wilkinson. *Editor of the Journal*—Sir W. de W. Abney, K.C.B., D.C.L., F.R.S., F.R.A.S. *Hon. Solicitor*—Francis Ince. *Hon. Treasurer*—John Sterry. *Secretary and Librarian*—A. W. W. Bartlett, 66 Russell Square, London, W.C.

Scarborough and District Photographic Society.—Meetings held at the Museum, Scarborough. *President*—Mr. Harry Wanless. *Vice-President*—A. H. Robinson. *Committee*—Miss M. McCallum, Mrs. Atkinson, F. Foster, C. E. Collings, J. Pickering, J. H. Rowntree. *Treasurer*—J. Whitfield. *Secretary*—T. F. Brogden, 92 North Marine Road, Scarborough.

Shaw Church Institute Photographic and Art Society.—(ESTABLISHED 1883.)—Meetings held at Shaw Church Institute. *President*—Rev. J. T. Ormerod, M.A. *Vice-President*—J. W. Farrar. *Committee*—J. R. Royds, J. H. Broadbelt, J. R. Heaton. *Treasurer and Secretary*—John Maiden, 91, Rochdale Road, Shaw, near Oldham.

Sheffield and Hallamshire Photographic Society.—(ESTABLISHED 1896.)—Meetings held at the Baptist School Rooms, Cemetery Road, Sheffield. *President*—F. Mottershaw. *Vice-Presidents*—G. H. Bagshaw, J. A. Leach, Geo. Bingham. *Committee*—Messrs. R. Heathcote, L. Britton, A. Bingham, J. W. Mottershaw, J. Ellis, A. Anderson, C. Haykin, G. H. Tomlinson, Billing. *Treasurer and Secretary*—Fred Lowe, 41 Carrington Road, Sheffield.

Sheffield Optical Lantern Society.—(ESTABLISHED 1890.)—Meetings held at St. Paul's Schools, Cambridge Street, third Thursday in the month. *President*—Dr. J. A. Manton. *Vice-Presidents*—J. H. Lygo, J. W. H. Wilson, Hy. Staniforth, B. Carr, J. Clowes. *Council*—J. Temperton, M. Wilson, C. Thornhill, J. E. Glenn, T. W. Simonson, J. Cunningham, S. Hughes, H. J. Clague, J. W. Copley. *Reporter*—J. Cunningham. *Treasurer*—E. Copley. *Secretary*—T. G. F. Allen, 59 Melrose Road, Sheffield.

MORGAN & KID

RICHMOND · LONDON · S.W.

Sheffield Photographic Society.—(ESTABLISHED 1875.)—Meetings held at the Masonic Hall. *President*—Dr. H. G. Paterson. *Vice-Presidents*—G. Tomlinson, G. H. Dav, S. Camp. *Council*—J. W. Charlesworth, W. T. Furniss, Harold Hill, A. W. Hill, J. H. Lygo. *Librarian*—C. F. Brindley. *Reporter*—J. W. Wright. *Treasurer*—T. G. Hibbert. *Secretary*—T. H. Muxlow, 136 Steade Road, Sharrow, Sheffield.

Shropshire Camera Club.—Meetings held at Castle Chambers, Shrewsbury. *President*—Rev. A. J. Moriarty, D.D. *Vice-Presidents*—W. E. Harding, E. Cureton, M.D., J. L. Della-Porta, J. R. Greatorox. *Council*—F. R. Armytage, Wallace Heath, H. H. Hughes, R. J. Irwin, P. W. Pilcher. *Treasurer*—H. Aikin. *Secretary*—W. D. Haydon, The Schools, Shrewsbury.

Simpson Memorial Camera Club.—(ESTABLISHED 1902.)—Meetings held at the Simpson Memorial Schools, Moston, Manchester. *President*—Dr. Lakin. *Vice-President*—W. H. Tyas. *Secretary*—Chas. H. Brierley, 35 Amos Street, Moston, Manchester.

Society for the Encouragement of Arts, Manufactures, and Commerce.—(FOUNDED IN 1754. INCORPORATED BY ROYAL CHARTER IN 1847.)—Meetings are held at John Street, Adelphi, London, W.C. *President*—H.R.H. the Prince of Wales, K.G. *Vice-Presidents*—H.R.H. the Duke of Connaught and Strathearn, K.G., Sir Frederick Abel, Bart., K.C.B., G.C.V.O., D.C.L., F.R.S., Duke of Abercorn, K.G., C.B., Sir William Abney, K.C.B., D.C.L., D.Sc., F.R.S., The Lord Chief Justice, G.C.M.G., Lord Avebury, D.C.L., F.R.S., Sir Benjamin Baker, K.C.M.G., F.R.S., Sir Frederick Bramwell, Bart., D.C.L., F.R.S., Sir Stuart Colvin Bayley, K.C.S.I., C.I.E., Sir George Birdwood, K.C.I.E., C.S.I., M.D., LL.D., Sir Edward Birkbeck, Bart., Major-Gen. Sir Owen Tudor Burne, G.C.I.E., K.C.S.I., Michael Carteghe, F.C.S., Professor James Dewar, LL.D., F.R.S., Sir Edwin Durning-Lawrence, Bart., M.P., Hon. Sir Charles W. Fremantle, K.C.B., Henry Graham Harris, Ludwig Mond, Ph.D., F.R.S., Hon. Richard Clere Parsons, Sir Walter S. Prideaux, Sir William Chandler Roberts-Austen, K.C.B., F.R.S., Lord Rothchild, Sir John Wolfe-Barry, K.C.B., F.R.S. *Ordinary Members of Council*—Sir Mancherjee Merwanjee Bhownagree, K.C.I.E., M.P., Sir Alexander R. Binnie, R. Brudenell-Carter, F.R.C.S., Professor Francis Elgar, LL.D., F.R.S., Robert Kaye Gray, Sir William Lee-Warner, K.C.S.I., Sir George T. Livesey, Sir Walter Peace, K.C.M.G., Sir Westby B. Perceval, K.C.M.G., Sir William Henry Preece, K.C.B., F.R.S., Alexander Siemens, Sir John I. Thornycroft, F.R.S. *Treasurers*—Sir Owen Roberts, M.A., D.C.L., F.S.A., Carmichael Thomas. *Secretary*—Sir Henry Trueman Wood, M.A. *Soane Trustee*—Sir George Birdwood, K.C.I.E., C.S.I., LL.D., M.D.

FOR BROMIDE PAPERS

· INVENTORS · AND · STILL · FIRST ·

Southampton Camera Club.—(ESTABLISHED 1896.)—Meetings held at the Philharmonic Hall, Southampton. *President*—W. Burrough Hill, F.S.I. *Vice-Presidents*—A. Horsley Hinton, G. T. Vivian, Rev. E. C. Bennett, Dr. Weston. *Committee*—A. C. Berry, R. W. Carden, J. T. Compton, A. Copeland, W. J. Goatcher, A. E. Henley, Max Mills, M. O'Connor, A. G. Rider, F. Winzar. *Hon. Reporter*—Geo. R. Johnson. *Treasurer*—W. H. Trigg. *Secretary*—S. G. Kimber, Oakdene, Highfield, Southampton.

South London Photographic Society.—(Affiliated with the Royal Photographic Society.)—Meetings held at Hanover Hall, Hanover Park, Rye Lane, Peckham, S.E. *Patrons*—His Grace the Duke of Newcastle and G. A. Maull. *President*—Chas. H. Oakden, F.R.P.S. *Vice-Presidents*—Maurice Howell, M.P.S., S. W. Gardner, W. F. Slater, F.R.P.S., A. E. Allen, J. T. French. *Committee*—J. T. French, M. Howell, W. F. Slater, C. F. Dickinson, E. G. Ruckes, E. R. Bull, G. J. T. Walford, H. Esler, F. W. Grigg, W. Page, B. Lyon, A. Fellows, J. K. Ayling, C. Budd, C. W. Walker. *Curator*—W. C. Boyce. *Hon. Lanternist*—H. F. Mawbey. *Delegates to the Affiliation of Photographic Societies*—Chas. H. Oakden, F.R.P.S., and Frank Goddard. *Hon. Treasurer*—C. Churchill, F.R.P.S. *Hon. Secretary*—Mr. Calder Marshall, F.C.A., 41 Glenton Road, Lee, S.E. *Hon. Assistant Secretary*—G. H. Lovegrove 18 Foxgrove Road, Beckenham, Kent. *Hon. Excursion Secretary*—H. C. Beckett, 44 Edith Road, Peckham, S.E.

South Manchester Photographic Society.—Meetings held at the West Didsbury Public Hall, Burton Road, West Didsbury. *President*—E. J. Brooks. *Vice-Presidents*—Dr. Glascott and P. H. Jordan. *Committee*—J. R. Gibbs, F. W. Handley, C. Holding, S. Jewsbury, Dr. Lancashire, E. Lee, W. J. Pearce. *Hon. Treasurer*—F. O. Pickard. *Hon. Secretaries*—F. Higginbottom, 4 Kinnaird Road, Withington, and H. A. Neale, "Brentwood," Clothorn Road, Didsbury.

South Norwood Photographic Society.—(ESTABLISHED 1899.)—Meetings held at the Constitutional Club, 10 South Norwood Hill, S.E. *President*—John Smith. *Vice-Presidents*—H. Smith, H. Clark, J. T. Sandell. *Committee*—B. T. Luckett, W. E. Nicholls, G. R. Nicholls, C. Morgan Smith, W. Maides, L. W. Bause. *Treasurer*—F. C. Bause. *Secretary*—G. R. Beckett, 28 Birchanger Road, South Norwood, S.E.

Southport Photographic Society.—(ESTABLISHED 1890.)—Meetings held at the Temperance Institute. *President*—D. E. Benson, A.M.I.C.E. *Vice-Presidents*—John Noton and Joseph Lambert. *Committee*—C. H. Brown, J. R. Cave, H. Payne, M.D., J. C. Nichol, R. W. Woods. *Treasurer*—Willis Brunt. *Secretary*—Geo. Cross, 15 Cambridge Arcade,

MORGAN & KID

RICHMOND · LONDON · S.W.

Southport Y.M.C.A. Camera Club.—(ESTABLISHED 1896.)—Meetings held at the Y.M.C.A. Rooms, Eastbank Street, Southport. *President*—S. J. Elliott. *Vice-Presidents*—Henry Ball and S. R. Parks. *Committee*—S. Y. Ormerod, E. W. Mellor, P. Dickinson, T. E. Harrison, W. H. G. Lea. *Treasurer*—J. T. Rigby. *Secretary*—F. B. Jesper, 8 Promenade, Southport.

Southsea Photographic Society.—(ESTABLISHED 1888.)—Meetings held at 5 Pembroke Road, Portsmouth. *President*—W. G. Lewis. *Vice-President*—H. A. Canning. *Committee*—E. H. Purvis, H. T. Lilley, M. A., A. Fisher, A. S. A., Col. R. Barrington Baker, Dr. C. H. Newby, W. Cliffe. *Treasurer*—F. S. Hoyte. *Secretary*—F. J. Mortimer, 10 Ordnance Row, Portsea, Portsmouth.

South Shields Photographic Society.—Meetings held at the Y.M.C.A. Rooms, Charlotte Terrace. *President*—W. Hoare. *Vice-Presidents*—A. E. Cowling, J. Davenport, H. G. Fowler, A. J. Hunter, W. Parry, T. E. Taber, C. W. Wood. *Committee*—R. Brady, A. Jours, G. S. Robinson, A. G. Anderson. *Hon. Steward*—T. E. Taber. *Hon. Auditor*—W. E. Beck. *Treasurer*—M. H. Sadler. *Secretaries*—R. Brady, Albion Terrace, Fowler Street; A. W. Hoare, 53 Wouldhave Street.

St. Michael's Amateur Photographic Society.—Meetings held at St. Michael's Church Institute, 42 St. Michael's Road, Liverpool, S. *President*—Rev. H. Gresford Jones. *Secretary and Treasurer*—Samuel Dobson, 19 Errol Street, St. Michael's, Liverpool.

Stafford Photographic Society.—(ESTABLISHED 1895.)—Meetings held at the Old Police Barracks, Stafford. *President*—G. E. Hann. *Vice-President*—H. W. Cooper. *Committee*—M. Averill, F. Cliff, W. Kirkham, J. Venables. *Treasurer*—Geo. Wray. *Secretary*—Henry E. Burn, Totnam Villa, Stone Road, Stafford.

Stereoscopic Club.—*Secretary*—W. J. Chadwick, 116 Deansgate, Manchester.

Stereoscopic Society.—(ESTABLISHED 1893.)—*President*—W. W. Stainthorpe, M.D., J.P., &c. *Vice-Presidents*—Herr Victor Selb and F. Dunsterville. *Treasurer and Secretary*—B. Diveri, B.A., Viewfield, Huntly, N.B.

Stockport Photographic Society.—*President*—Colonel Turner, J.P. *Council*—J. Barlow, R. Gardner, J. Evans, C. H. Battersby, W. Holt, A. W. Slater, S. Platt. *Treasurer*—J. J. Rothwell. *Hon. Secretary*—Thomas Gould, 114 Chestergate, Stockport.

FOR ENLARGEMENTS BROMIDE · CARBON · PLATINOTYPE

Sun & Company.—(ESTABLISHED 1886.)—A Postal Photographic Society for advanced workers, limited to forty amateurs, for the monthly circulation and criticism of photographs, entirely the work of members, and for a general interchange of ideas, with a view to mutual advancement in the science and art of photography. *Committee*—H. Newson, Colonel Biggs, Wallace Heath, and the Hon. Secretary. Application for vacancies should be made to the Hon. Secretary, Martin J. Harding, Egerton House, Havelock Road, Shrewsbury.

Sunderland Camera Club.—(ESTABLISHED 1899.)—Meetings held at the Ennerdale Lecture Hall.—*President*—Wm. Thackray. *Chairman*—Wm. P. Mail. *Vice-Chairman*—K. S. Yeaman. *Committee*—F. W. C. Common, C. T. Cothay, W. P. Mail, G. Le Pan Newstead, S. Ord, W. Thackray, H. W. Wardropper, K. S. Yeaman. *Recorder*—G. Le Pan Newstead. *Librarian*—O. Moller. *Auditor*—F. W. C. Common. *Treasurer*—C. T. Cothay. *Secretary*—H. Wallis Wardropper, Belle Vue Park, Sunderland. *Assistant Secretary*—Selby Ord.

Sunderland Photographic Association.—(Affiliated with the Royal Photographic Society.)—(ESTABLISHED 1888.)—Meetings held at the Subscription Library. *President*—William Milburn. *Vice-Presidents*—William Bartram and Thomas Walton. *Council*—W. C. Brown, J. Deans, T. Fitzgibbon-Forde, W. Horan, J. W. Hunter, C. Laing, A. Peddie, R. G. Posgate. *Hon. Auditor*—W. Carter. *Hon. Treasurer*—W. Pope. *Hon. Secretary*—William E. Kieffer, 1 Sterling Street, Sunderland.

Sutton Photographic Club.—*Chairman*—C. J. Marshall, A.R.I.B.A. *Hon. Secretary*—C. Thwaites, M.Inst.C.E., F.R.A.S., Burnell Road, Sutton, Surrey.

Swadlincote and District Photographic Society.—Meetings held at Hill Street Baptist Schoolroom. *President*—G. S. Bragge. *Vice-President*—H. H. Raphael, Dr. H. Moir, H. Tooth. *Committee*—E. H. Hobart, A. Gretton, F. W. Edwards, W. S. Smith, R. F. Baker, F. Adams. *Secretary and Treasurer*—F. J. Edwards, 64 Coppice Side, Swadlincote.

Talbot Album Club.—(ESTABLISHED 1886.)—*Secretary*—Frederick H. Davies, Hampton-in-Arden, Warwickshire.

"The Argosy" Postal Photographic Club.—(ESTABLISHED 1887.)—*Secretary*—Rev. C. F. Lowry Barnwell, Stramshall Vicarage, Uttoxeter.

The Guild, Leeds.—*Committee*—W. M. Coultas, J. H. Gash, Percy Sheard. *Treasurer and Secretary*—R. Stockdale, 17 Mount Preston, Leeds.

MORGAN & KID

RICHMOND · LONDON · S.W.

Thornton Heath Polytechnic Photographic Society.—(ESTABLISHED 1893.)

Meetings are held at the Thornton Heath Polytechnic. *President*—C. Owen Fowler, M.D. *Vice-Presidents*—Alderman G. J. Allen, J. P., F. O. Bynoe, R. Child Bayley, F.R.P.S., A. B. Chatwood, B.Sc., G. Edwards. *Committee*—Mrs. F. O. Bynoe, W. C. H. Anson, G. F. Course, B. E. Edwards, W. G. Langridge, A. Goymer, P. Putnam, J. H. Robertson, W. H. Rogers. *Hon. Lanternist*—W. H. Rogers. *Hon. Librarian*—P. Putnam. *Hon. Treasurer*—T. Ironmonger. *Hon. Secretary*—W. Burwell Smith, 34 Ecclesbourne Road, Thornton Heath

Trinity College (Glenalmond) Photographic Society.—(ESTABLISHED 1886.)

President—A. S. Reid, M.A., F.R.S. *Vice-President*—E. S. Lytell. *Committee*—Photographic Committee. *Treasurer*—G. S. Kennedy. *Secretary*—K. Barge, Trinity College, Glenalmond, Perth, N.B.

Tunbridge Wells Amateur Photographic Association.—(ESTABLISHED 1887.)

Meetings held at the Mechanics' Institute, Dudley Road. *Patron*—Sir David Salomons, Bart., M.A., D.L. *President*—F. G. Smart, M.A., J.P. *Vice-Presidents*—Rev. A. T. Scott, M.A., E. R. Ashton, S. J. Snelgrove. *Committee*—J. H. Chapman, A. W. Pierson, O. E. Jenkinson, J. H. Spencer. *Hon. Lanternist*—A. W. Pierson. *Hon. Auditor*—Edward Catchpole. *Treasurer*—B. Whitrow. *Secretary*—Joseph Chamberlain, Taakerville, Cambridge Street. *Hon. Assistant Secretary*—H. Wild, Kinnellar, Eden Road.

Tyne Side Camera Club.—Meetings held at Rye Hill. *President*—A. B.

Gardiner. *Vice-Presidents*—W. Carr, J. Purvis, W. Bell. *Treasurer*—J. W. Fraser. *Secretary*—Joseph F. McKie, 9 Rye Hill Cottages, Newcastle-upon-Tyne.

Tyneside Geographical Camera Club.—(ESTABLISHED 1897.)

Meeting held in the Reading Room, Geographical Institute, Barras Bridge Newcastle-upon-Tyne. *President*—His Grace the Duke of Northumberland. *Secretary and Treasurer*—John Scott, 10 Mosley Street Newcastle-upon-Tyne.

Ulster Amateur Photographic Society.—(ESTABLISHED 1885.)

Meetings held at the Museum, College Square North, Belfast. *President*—William Gray, M.R.I.A. *Vice-Presidents*—John Brown, F.R.S., F.P.S., A.M.I.E., Cecil E. Shaw, M.A., M.D., Alex. Tate, C.E., Professor E. A. Letts, D.Sc., Ph.D., F.R.S.E., F.C.S., F.I.C., W. E. Williams. *Committee*—Miss E. Haslett, Miss W. Haslett, S. W. Allworthy, M.D., General Bland, R.E., E. Bingham, D. Elliott, B.A., J. McCleery, William McLean. *Hon. Librarian*—C. Mitford Martin. *Hon. Lanternist*—C. Mitford Martin. *Treasurer*—J. Campbell Carson. *Secretary*—Thomas N. Murray, The Museum, College Square North, Belfast. *Irish Tourist Correspondents* (stamp for reply)—Secretary and Hon. Librarian.

FOR BROMIDE PAPERS INVENTORS AND STILL FIRST

Wakefield Photographic Society.—(ESTABLISHED 1890.)—Meetings held at the Church Institution. *President*—Wm. Holmes. *Vice-Presidents*—C. Miles, H. M. Briggs, J. A. Cass. *Committee*—Major Norwood, W. Woodhead, A. Darley, F. W. Tattersall, J. Marriott, H. Heptonstall. *Secretary and Treasurer*—R. Robson, 1 Dunelm Terrace, Sandal Wakefield.

Walsall Amateur Photographic Society.—*President*—John Hildick. *Committee*—W. H. Bullock, W. J. S. Brown, H. E. Butler, W. C. Checkley, F. B. Edwards, W. A. Hubball, W. Meikle, G. E. Oldbury, T. Partridge, H. B. Smith, George Warner, J. Whitworth. *Auditor*—H. B. Smith. *Hon. Treasurer*—E. A. Day. *Hon. Secretary*—W. T. Comer, D.B.O.A., F.S.M.C., Arcade, Walsall.

Walthamstow Photographic Society.—(ESTABLISHED 1894.)—Meetings held at Mission Hall, Vestry Road, Walthamstow. *President*—W. A., Longmore, F.R.I.B.A. *Vice-President*—Thomas Willats. *Committee*—E. W. Appleton, James Cox, F. T. Hitchman, A. G. Long, T. R. Nunn. *Treasurer*—Eben. Clarke. *Secretary*—Walter H. Judson, 31 Merton Road, Walthamstow.

Walton (Liverpool) Photographic Society.—(ESTABLISHED 1889.)—Meetings held at the Walton Church Schools. *President*—Geo. Latimer. *Committee*—F. Murphy, Jno. Kennedy, F. O. Creswell, M. Dullehan, H. Sharrock, H. Whittle. *Treasurer and Secretary*—T. Bickerstaff 79 Raveliffe Road, Walton, Liverpool.

Warrington Photographic Society.—*President*—John Fairhurst. *Vice-Presidents*—E. J. Hall and E. V. Walker. *Committee*—W. Winstanly, Jas. Harding, D. S. Birrel, W. H. Podmore, H. Miller, E. W. Clarke. *Hon. Lanternist*—J. J. Armstrong. *Hon. Auditor*—P. Dalton. *Hon. Treasurer*—J. H. Kertland. *Hon. Secretaries*—W. J. Twiss and K. F. Bishop.

Waterloo and Blundellsands Photographic Society.—*President*—G. E. H. Rawlins. *Vice-President*—W. G. Eyre. *Council*—E. L. Bower, H. Banister, G. Douglas, G. Richardson, L. Sproule. *Magazine Editors*—G. Douglas, E. L. Bower, L. Sproule. *Hon. Treasurer*—H. B. Bain, *Hon. Secretary*—T. B. Dean, The Dunes, Blundellsands.

West Bromwich Municipal Science School Photographic Society.—(ESTABLISHED 1898.)—Meetings held at the Institute, West Bromwich. *President*—R. Lloyd Whiteley, F.I.C., F.C.S. *Vice-President*—H. R. Prescott. *Committee*—F. W. Cotterell, T. W. Eayres, F. V. Wilkinson, D. G. Mackintosh. *Secretary and Treasurer*—R. Leach, 47 Birmingham Road, West Bromwich.

West London Photographic Society.—Meetings held at Broadway Lecture Hall, Hammersmith. *President*—Geo. Lamley. *Vice-President*—E. T. Holding. *Council*—H. L. Batting, W. Collett, E. E. Gibbs, F. C. Hart, D. C. Isaacs, A. Minnis, L. Selby, W. Tomes. *Hon. Lanternist*—R. Horton. *Hon. Treasurer*—A. E. Cockerell. *Hon. Secretary*—J. Brown, 28 Welje Road, Ravenscourt Park, W.

MORGAN & KID

RICHMOND · LONDON · S.W.

West Surrey Photographic Society.—(ESTABLISHED 1887.)—Meetings held at the Railway Tavern, 110 Battersea Rise, S.W. *President*—J. T. Price. *Vice-Presidents*—J. Bulbeck and R. H. Baskett. *Committee*—G. W. Coleman, W. T. Marriott, C. Sheed, S. Smith, F. G. Tryhorn. *Hon. Librarian*—V. T. Serin. *Hon. Lanternist*—T. Digby Mottram. *Hon. Secretary and Treasurer*—W. H. Wilshire, 236 Lavender Hill, S.W.

Weymouth Photographic Society.—(ESTABLISHED 1895.)—Meetings held at the Technical Schools. *President*—H. J. Groves. *Vice-Presidents*—W. Callander and T. G. Rowe. *Treasurer*—D. F. Allen. *Secretary*—Francis C. Mace, 105 St. Mary Street, Weymouth.

Widnes Photographic Society.—(ESTABLISHED 1898.)—Meetings held at Bedford Chambers, Victoria Road, Widnes. *President*—A. J. Squires. *Vice-Presidents*—V. C. Driffield, H. T. Mannington, L. West. *Committee*—J. Newburn, R. J. Gow, G. J. Warner, J. Gandy, J. Pilling, E. MacDonald. *Treasurer*—T. Cosier. *Secretaries*—J. W. Towers, Croft Street, and A. Hewitt, Victoria Road.

Wigan and District Camera Club.—(ESTABLISHED 1899.)—Meetings held at Hope Hall. *President*—Walter Booth. *Vice-Presidents*—Wm. Baron, F. Fidler, A. Smith, M. Walters. *Committee*—Messrs. Dawson, Halliwell, Simm, Vitali, Walls. *Lanternists*—Messrs. Cookson and W. Simm. *Reporting Secretary*—T. H. Winstanley. *Secretary*—Geo. Rigby, 103 Dicconson Street West, Wigan.

Wimbledon Photographic Club.—(ESTABLISHED 1879.)—Meetings held at Anderton's Hotel, Fleet Street, London, E.C. *Trustees*—F. A. Bridge and A. Snowden Ward. *Committee*—G. E. Brown, A. Mackie, J. W. Mason, W. R. Stretton, H. P. Smith, Chas. Wallis, G. Wynne, J. W. Zaehnsdorf. *Hon. Librarian*—H. Muller. *Hon. Secretary and Treasurer*—T. W. Derrington, 85 Trinity Road, Wimbledon, S.W.

Whitby Camera Club.—(ESTABLISHED 1898.)—Meetings held at the Board Schools, Cliff Street. *President*—H. S. Horne. *Vice-Presidents*—J. Bruce, T. Newbitt, Wm. Brown. *Committee*—Wm. Ruff, A. Gray, J. Brookes, Wm. Brown, F. Falkingbridge, J. T. Ross. *Treasurer and Secretary*—G. S. French, 1 West Terrace, Whitby.

Whitstable Photographic Society.—(ESTABLISHED 1900.)—Meetings held at the Foresters' Hall. *President*—A. A. Kemp. *Treasurer and Secretary*—R. T. Wheeler, L.R.C.P., Ansdell House, Whitstable-on-Sea, Kent.

Wolverhampton Photographic Society.—(ESTABLISHED 1901.)—Meetings held at the Y.M.C.A., Darlington Street, Wolverhampton. *President*—Harold Holcroft, M.A., F.C.S. *Council*—T. Henry Cox, T. J. Gibson, D. Murrey, H. M. Painter, L. J. Reade, S. R. Rhodes, J. G. Wright. *Treasurer*—A. Eaton Painter. *Secretaries*—A. Eaton Painter, Leahurst, Waterloo Road, N., Wolverhampton, and A. E. Cooke, 70 Bath Road, Wolverhampton.

FOR ENLARGEMENTS BROMIDE CARBON PLATINOTYPE

Woodford Photographic Society.—(ESTABLISHED 1893.)—Meetings held at the Wilfrid Lawson Hotel, Woodford Green. *President*—W. L. F. Wastell. *Vice-Presidents*—A. Horsley Hinton and E. Marriage, F.R.P.S. *Council*—The Officers and H. T. Malby, F.R.P.S., H. Wilmer, F.R.P.S., Percy G. R. Wright, E. Carpenter. *Affiliation Delegates*—E. Marriage, F.R.P.S., and J. P. W. Goodwin. *Lanternist*—E. Noble. *Assistant Secretary and Librarian*—E. C. Winney. *Secretary and Treasurer*—F. G. Emler, 1 Florence Villas, Chelmsford Road, Woodford, N.E.

Woolwich Photographic Society.—(Affiliated to the Royal Photographic Society.)—Meetings held at St. John's Lecture Room, Wellington Street, Woolwich. *President*—Chas. Churchill, F.R.P.S. *Vice-Presidents*—W. H. Dawson, J. Desforges, F. W. Machen, J. Borthwick Panting, F.R.P.S. *Council*—J. Cregan, A. E. Harris, S. Hughesdon, S. A. Saffron, W. F. Slater, F.R.P.S., H. G. Weekes. *Librarian*—Alex. Lees. *Lanternist*—G. W. Tapp. *Auditors*—B. Hammond and B. G. Bishop. *Delegates to the Royal Photographic Society*—C. Churchill, F.R.P.S., and W. H. Nichols. *Hon. Secretary and Treasurer*—William H. Nichols, 30 Heavitree Road, Plumstead Common. *Assistant Hon. Secretary*—G. W. Tapp.

Worcestershire Photographic Survey Society.—(ESTABLISHED 1896.)—Meetings held at the Victoria Institute, Worcester. *President*—J. W. Willis Bund, D.L., F.S.A. *Vice-Presidents*—Lord Cobham, Lord Dudley, Earl Beauchamp, Joel Cadbury, T. J. Hobson. *Committee*—T. Duckworth, G. Haycox, T. B. Judson, S. Hill, R. H. Murray, B. H. Williams, J. Cam, W. H. Edwards. *Treasurer*—Mrs. Rowland Berkeley. *Secretary*—Chas. R. Sayer, Finstall Mount, Bromsgrove.

Worcester Tricycle Club (Camera Section).—(ESTABLISHED 1892.)—Meetings held at the Bell Hotel, Worcester. *President*—J. Wilkes. *Committee*—J. Cam, S. Hill, T. James, J. F. Santonna. *Treasurer*—F. E. Hill. *Secretary*—T. J. Hobson, 15 Albany Terrace, Worcester.

Yeadon and District Photographic Society.—(ESTABLISHED 1886.)—Meetings held at the Lecture Hall, Yeadon. *President*—Dr. Muschamp. *Vice-Presidents*—C. Smith, W. E. Fearnley, B. L. Bradley. *Committee*—T. Pratt, E. E. Slater, T. A. Womersley, R. P. Jibson. *Treasurer and Secretary*—E. Langley, Henshaw, Yeadon, Leeds.

York Photographic Society.—(ESTABLISHED 1887.)—Meetings held at the Victoria Hall, York. *President*—Watson Hirst. *Vice-Presidents*—B. Brooke and A. H. Hardcastle. *Council*—J. Cannell, H. Loadman, C. McDermid, R. Redpath, C. R. Watkinson. *Lanternist*—J. Dickinson. *Treasurer*—R. N. Shirt. *Secretary*—F. G. P. Benson, 50 Scott Street, York. *Assistant Secretary*—R. R. Tyrer.

Yorkshire Philosophical Society (Photographic Section).—(ESTABLISHED 1888.)—Meetings held at the Museum, York. *President*—Tempest Anderson, M.D., J.P. *Vice-Presidents*—J. N. Kitching. *Treasurer and Secretary*—H. Dennis Taylor, Stancliffe, Mount Villas, York.

COLONIAL PHOTOGRAPHIC SOCIETIES.

Amateur Photographic Association of Victoria.—(ESTABLISHED 1883.)—

Meetings held at the Royal Arcade, Bourke Street, Melbourne. *President*—J. W. Eggleston. *Vice-Presidents*—H. C. Mais, M.Inst.C.E., and R. Ferguson. *Committee*—J. Glover, C. B. Goslett, E. C. Joshua, F. A. Kernot, J. H. Mulvany, T. Stephens, H. J. Trowbridge, J. Wilkinson. *Treasurer*—E. K. Byrne. *Secretary*—F. W. Miscamble, F.I.A.V., 325 Collins Street, Melbourne.

Auckland Camera Club.—(ESTABLISHED 1881)—Meetings held at Queen

Street (over A. Jones & Co., dealers). *President*—Dr. J. Logan-Campbell. *Vice-Presidents*—R. B. Walrond, Josh Martin, E. Payton, D. Goldie. *Committee*—R. Pheney, M. Trenwith, A. Coomer, A. Jones. *Secretary and Treasurer*—H. R. Arthur, c/o Auckland Gas Company, P.O. Box 81.

Ballarat Photographic Society.—(ESTABLISHED 1880.)—Meetings held at

the School of Mines, Ballarat. *President*—Professor A. Mica Smith. *Treasurer*—J. Foster. *Secretary*—Frederick J. Martell, School of Mines, Ballarat.

Bendigo Amateur Photographic Association.—(ESTABLISHED 1894.)—Meet-

ings held at the School of Mines, McCrae Street. *President*—R. E. Jeffery. *Vice-President*—W. Vale. *Committee*—Miss Barlow, J. B. Edwards, F. D. Jones, J. W. Smith, R. T. Barlow, T. Hall, A. E. Duke. *Treasurer and Secretary*—James Miller, Bath Corner, Bendigo Victoria, Australia.

Canterbury Philosophical Institute (Photographic Section), Christchurch,

New Zealand.—Meetings held on second Tuesday in each month. *Hon. Secretaries*—S. Page and R. C. Bishop.

Cape Town Photographic Society.—(ESTABLISHED 1890.)—Meetings held

at the Y.M.C.A. Buildings. *Hon. President*—Sir David Gill, K.C.B., F.R.S. *Vice-President*—Professor W. S. Logeman. *Council*—G. Campbell Dickson, J. P. Edwards, E. C. Matson, E. H. Short, E. J. Steer, J. A. Yallop, Dr. R. Marlotto, Rev. W. Forbes. *Lanternist*—G. Ainslie. *Treasurer*—A. W. B. Smuts. *Hon. Secretary*—A. J. Fuller, P.O. Box 470, Cape Town.

COLONIAL PHOTOGRAPHIC SOCIETIES—continued.

Christchurch Photographic Society.—(ESTABLISHED 1901.)—Meetings held at 154 Worcester Street. *Patron*—A. E. G. Rhodes (Mayor of Christchurch). *President*—R. C. Bishop. *Vice-Presidents*—T. G. Strange and Henry Allison. *Committee*—W. E. Suckling, C. R. Woledge, J. Griffiths, H. K. Allison, W. G. Crawford. *Treasurer*—G. A. Bunz. *Secretary*—H. E. Gott, Box 110, G.P.O., Christchurch, N.Z.

Dai-Nippon Shashin Kyokwai (Photographic Association of Japan).—(ESTABLISHED 1893.)—Meetings held at Kwazoku-Kwaikan, Uchiyamashitacho, Tokyo. *President*—H. E. Prince M. Nijo. *Vice-President*—H. E. Viscount M. Nagaoka. *Committee*—Count U. Toda, Count S. Omura, Viscount B. Enonomoto, Viscount C. Okabe, Baron Hanabusa, D. Kikuchi, S. Toya, K. Ogawa, Dr. T. Kato, J. Tanaka, M. Nakajima, Dr. Marumo, R. Konishi, S. Kiga, H. Shigyo, S. Kajima. *Treasurers*—S. Ohashi and K. Ikeda. *Secretary*—K. Ogura 77 Minami-enokimachi, Ushigome, Tokyo.

Dunedin Photographic Society.—(ESTABLISHED 1890.)—Meetings held at Liverpool Street, Dunedin. *President*—R. Chisholm. *Vice-Presidents*—Wm. Melville and C. O. McKellar. *Committee*—A. J. Barth, R. A. Ewing, W. Gow, J. Laing, H. Gamble, S. Richards, W. Livingston. *Secretary and Treasurer*—J. Skottowe Webb, National Insurance Company of New Zealand, Dunedin.

Foochow Camera Club.—(ESTABLISHED 1892.)—Meetings held at Foochow, China. *President*—Wm. Muller. *Vice-President*—L. A. Mackinnon. *Committee*—President, Vice-President, Treasurer, and Secretary. *Secretary and Treasurer*—Wilbur T. Gracey, Foochow, China.

Gordon College Amateur Photographic Association.—(ESTABLISHED 1889.)—Meetings held at Gordon College, Geelong. *President*—H. G. Roebuck. *Vice-Presidents*—R. J. Smith and T. Lord. *Committee*—Messrs. Thacker, Price, McPhillimy, Mockridge, Brinsmead. *Treasurer*—S. R. J. Mawson. *Secretary*—J. Hammerton, jun., "Burngreave," 73 Little Kyrie Street, Geelong, Victoria, Australia.

Hamilton Association Camera Club.—(ESTABLISHED 1892.)—Meetings held at Hamilton Association Rooms, Public Library. *President*—J. M. Eastwood. *Vice-Presidents*—A. H. Baker and W. White. *Treasurer*—George Lees. *Secretary*—W. Henry Edwards, 168 Main Street, East, Hamilton, Ontario, Canada.

Hawkes Bay Camera Club.—(ESTABLISHED 1895.)—Meetings held at Napier, N.Z. *President*—F. W. Williams. *Vice-President*—J. Vigor Brown. *Committee*—S. E. Cooper, H. J. Bull, C. Saunders. *Secretary and Treasurer*—T. Bruce Bear, c/o Gas Company, Napier, New Zealand.

Ipswich and West Moreton Amateur Photographic Society, Ipswich, Queensland.—(ESTABLISHED 1893.)—Meetings on the second Wednesday of each month. *Hon Secretary*—E. Bostock, Brisbane Street, Ipswich, Queensland, Australia.

Johannesburg Photographic Society.—(ESTABLISHED 1899.)—Meetings held at the Society's Rooms, Reliance Buildings, Kerk Street. *President*—J. Percy Fitzpatrick. *Vice-Presidents*—Dr. Kendal Franks, C.B., &c., and Rev J. C. Harris. *Committee*—The above and Dr. H. W. Bloomfield, W. Newby-Fraser, P. N. Heath, T. E. Goodall, J. Johnson Hoyle, E. Mills, W. R. Prior, R. D. Harris, J. H. L. Manisty, P. Greathead. *Hon. Secretary and Treasurer*—H. C. Haddon, Box 4822, Johannesburg.

COLONIAL PHOTOGRAPHIC SOCIETIES—*continued.*

- Kimberley Camera Club.**—(ESTABLISHED 1890.)—Meetings held at the Club Rooms. *President*—James Lawrence, M.L.A. *Chairman*—Montague Thane. *Vice-Chairman*—F. H. Hancox. *Council*—J. Childs, E. Goffe, L. Atkinson. *Secretary and Treasurer*—Charles Howie, P.O. Box 233, Kimberley, S.A.
- Maritzburg Camera Club.**—(ESTABLISHED 1893.)—*President*—A. Allerton. *Vice-President*—D. M. Eadie. *Committee*—S. S. Watkinson, W. Hay, A. Hopkins. *Treasurer*—W. E. Marsh. *Secretary*—F. Eewins, 14 Timber Street, Maritzburg, Natal.
- Montreal Camera Club.**—(ORGANISED 1890. INCORPORATED 1892.)—Place of Meeting, 4 Phillip's Square, Montreal, Canada. *President*—George Summer. *Vice-President*—A. W. Cole. *Committee*—Edward Barry, David R. Brown, G. W. Davis, Robert W. Elliott, N. N. Evans, F. T. Jennings, James J. Mason, Archibald McLean, C. K. Temple, R. Wilson, jun. *Secretary and Treasurer*—A. Clarence Lyman, 157 St. James Street, Montreal, Canada.
- Nelson Camera Club.**—(ESTABLISHED 1889.)—Meetings held at the Club Rooms, Hardy Street, Nelson. *President*—C. Y. Fell. *Committee*—H. Brusewitz, H. V. Gully, H. J. Deck. *Treasurer*—F. W. Hamilton. *Secretary*—A. H. Patterson, Hardy Street, Nelson, N.Z.
- Northern Tasmanian Camera Club.**—(ESTABLISHED 1889.)—Meetings held at Albert Hall, Launceston. *President*—Rev. F. J. Nance, M.A. *Vice-Presidents*—P. C. Maxwell and R. C. Kermode. *Committee*—C. Hart, J. E. Heritage, J. H. Lithgow. *Secretary and Treasurer*—F. Styant Browne, 112 Brisbane Street, Launceston, Tasmania.
- N.S.W. Lands Department Photographic Society, Sydney.**—Meetings held on the last Thursday in each month. *Chairman*—J. R. Yorke. *Committee*—O. W. Ballhausen, E. T. Davis, M. V. Murphy, H. P. Rich, R. W. Vale. *Hon. Secretary and Treasurer*—William Hamilton, Lands Department, Sydney.
- N.S.W. Railway and Tramway Camera Club.**—(ESTABLISHED 1894.)—Meetings held at the Railway Institute, Radfern. *President*—H. McLachlan. *Vice-President*—H. Carruthers. *Committee*—Messrs. Marsh, Burrell, Petterson, Leslie. *Treasurer*—J. Paterson. *Secretary*—A. Johnson, Power House, Rusheutters Bay.
- Perak Amateur Photographic Society.**—(ESTABLISHED 1895.)—Meetings are held in Poverty Flat, Museum Road, Taiping. *President*—L. Wray, jun., M.I.E.E., F.Z.S. *Committee*—M. J. Wright, M.B., C.M., R. O. N. Anderson, A.M.I.C.E., F. Duberly, W. van Dart. *Hon. Secretary and Treasurer*—George Bain, Taiping, Perak.
- Photographic Association of Canada.**—(ESTABLISHED 1883.)—Place of Meeting, London, Ontario, Canada. *President*—H. S. Park (Toronto). *Vice-Presidents*—J. F. Jackson (Barrie) and W. Still (Orangeville). *Executive Committee*—H. S. Park, J. F. Jackson, W. Still, J. H. Ramsay, T. D. Hastings. *Treasurer*—J. H. Ramsay (Toronto). *Secretary*—Thomas D. Hastings, 169 Dundee Street, London, Ontario, Canada.
- Photographic Society of India.**—(ESTABLISHED 1886.)—Meetings are held at 57 Park Street, Calcutta. *President*—N. Giannacopulo. *Vice-Presidents*—A. Casperz and A. Tocher. *Committee*—E. S. Atherton, Oldbury Burne, J. E. Clarke, A. F. Norman, Dr. Pearse, H. J. Simmons, Maharaja Kumar. P. K. Tagore, A. Thompson, E. Thornton. *Treasurer*—C. H. Coates. *Secretary*—A. R. Catto, 57 Park Street, Calcutta.

COLONIAL PHOTOGRAPHIC SOCIETIES—*continued.*

Photographic Society of New South Wales.—(ESTABLISHED 1894.)—Meetings held at 149 King Street, Sydney. *President*—His Honour Judge Docker. *Vice-Presidents*—Sir James Fairfax, R. N. Kirk, E. T. Davis, J. S. Stening. *Committee*—P. H. Bushell, C. W. Middleton, James Heron, A. J. Perier, W. Johnson. *Treasurer*—W. C. Fishers. *Secretary*—Fred. W. Proctor, Box 829, G.P.O., Sydney.

Photographic Union of New South Wales, Sydney.—Meetings held on the first Thursday of each month. *Hon. Secretary*—Charles H. Kerry.

Queensland Photographic Society.—(ESTABLISHED 1883.)—Meetings held at the Technical College, Ann Street, Brisbane. *President*—C. D. Ferguson. *Vice-Presidents*—Dr. John Thomson and Dr. Wilton Love. *Committee*—C. J. Pound, F. Davey, H. W. Mobsby, W. L. Crompton. *Treasurer*—J. L. Kinloch. *Secretary*—W. C. Voller, 171 Queen Street, Brisbane.

South Australian Photographic Society.—(ESTABLISHED 1885.)—Meetings held at the Society of Arts Rooms, Institute, North Terrace, Adelaide, South Australia. *President*—Andrew Scott, B.A. *Vice-Presidents*—S. Smeaton, B.A., and Chas. Radcliffe. *Committee*—The Executive Officers and N. W. Beaney, R. F. Griffiths, A. H. Kingsborough, C. F. Rainsford, R. Bowen (Hon. Librarian). *Treasurer*—F. Gabriel. *Secretary*—P. H. Evans, care of the South Australian Chamber of Manufactures (Incorporated), Adelaide, S.A.

Southland Camera Club, Invercargil, New Zealand.—Meetings held on the third Monday in each month. *Hon. Secretary*—A. M. Macdonald, Esk Stores.

St. John Camera Club.—(ESTABLISHED 1893.)—Meetings held at 65 William Street, St. John, New Brunswick. *Secretary*—J. Kaye-Allison, P.O. Box 401, St. John, N.B., Canada.

Toronto Camera Club.—(ESTABLISHED 1887.)—Meetings held at the Forum Building, Yonge Street, Toronto, Ontario. *President*—Edmund E. King, M.D. *Vice-Presidents*—J. G. Ramsey and E. Stanger. *Committee*—W. H. Moss, G. R. Baker, W. Bohne, H. B. Lefroy, W. McTaggart, H. Hampshire. *Secretary and Treasurer*—John J. Woolnough, 32 Cottingham Street, Toronto.

Upper Canada College Camera Club.—(ESTABLISHED 1891.)—Meetings are held at Upper Canada College, Toronto, Ontario, Canada. *Secretary*—O. M. Biggar, 249 Simcoe Street, Toronto, Ontario, Canada.

Wanganui Camera Club.—(ESTABLISHED 1894.)—Meetings held at Jackson & Co.'s Rooms, Ridgeway Street. *President*—S. S. Griffiths. *Vice-President*—A. A. Gower. *Committee*—T. W. Downes, F. J. Kersley, T. Allison, G. Pownall, F. J. Denton. *Secretary and Treasurer*—C. W. Babbage, St. John's Hill, Wanganui.

Wellington Camera Club.—(ESTABLISHED 1892.)—Meets second Thursday in each month at Exchange Buildings, Wellington, New Zealand. *President*—A. de Bathe Brandon. *Vice-Presidents*—A. C. Gifford, M.A., and J. McLellan. *Committee*—Thomas Pringle, G. W. Bartrop, M. C. Smith, W. McGregor Wright, A. B. Keyworth, M. Buckley Joyce. *Treasurer*—T. M. Hardy. *Secretary*—Joseph Alfred Heginbotham, Tea Gardens, Kilbirnie, Wellington, New Zealand.

COLONIAL PHOTOGRAPHIC SOCIETIES—*continued.*

West Australian Photographic Society, Perth.—(ESTABLISHED 1894.)—Meetings held on the third Wednesday in each month. Annual Meeting in September. *Hon. Secretary*—A. R. L. Wright, Public Works Department, Perth.

Westland Camera Club, Hokitika, New Zealand.—*President*—James Park. *Hon. Secretary*—James King.

Working Men's College Photographic Club.—Meetings held in the Lecture Hall, at the College, Latrobe Street, Melbourne. *President*—Professor Kernot, M.A., M.E. *Vice-Presidents*—F. A. Campbell, C.E., T. C. Camm, A. J. Campbell, A. W. Craven, M.P., D. Le Souef, C.M.Z.S. *Committee*—J. Davis, T. E. Eastham, J. Alexander, C. B. Goslett, E. C. Joshua. *Hon. Instructor*—James Aebi. *Lantern Engineers*—A. B. Sturtevant, J. Glover, H. Hampson, J. Cathie, A. B. Weire. *Librarian*—Miss E. Cassidy. *Press Correspondent*—W. H. Gregson. *Hon. Chairman of Judging Committee*—Robert Harvie. *Hon. Treasurer*—J. Petersen. *Hon. Secretary*—Arthur J. Relph, Government Printing Office, Melbourne; or 33 Palermo Street, South Yarra. *Assistant Secretary*—C. R. Du Rieu.

CONTINENTAL PHOTOGRAPHIC SOCIETIES.

Amateur Fotografen Vereeniging te Amsterdam.—Established September 1, 1887. Place of Meeting, Spui 2, Corner of Handboogstraat. Ign. Bispinck, President. K. Job, jun., Treasurer. T. P. Goedhoop, Breedeweg 36, Watergraafsmeer, near Amsterdam.

Amateur Photographen Vereeniging "Daguerré."—Established 1890. Meetings held at Groningen. G. P. Smith, President. R. Roelfsema, Pzn., Vice-President. J. H. J. Gorter, Treasurer. N. de Jager, Hint. Jansstraat, Groningen, Secretary.

Association Belge de Photographie.—Established 1874. Meetings are held at the Palais du Midi, Brussels. J. Casier, President. MM. J. Maes et Ch. Puttemans, Vice-Presidents. MM. Canfyn, Claeys, Gilbert, Goderus, Hassreidter, Hermans, Jossart, Losseau, Dupret, Nieuwland, Peltzer, Roland, Rutot, Selb, Robert, Committee. A. Nyst, Treasurer. M. Vanderkindere, 97 Avenue Brugmann, Bruxelles, Secretary.

Association Nationale des Photographes Amateurs.—Fondée le 15 Mars, 1894, et autorisée par arrêté préfectoral du 22 Décembre, 1894. Place of Meeting, au domicile du Président, actuellement à Châteaugiron (Ille-et-Vilaine). Alfred Savary, President. M. Jousseau, Vice-President. MM. Cosnard, Le Sage de la Haye, Marnelle, and Le Millier, Committee. Roul de la Helière, au Château de Châteaugiron (Ille-et-Vilaine), Secretary and Treasurer.

Dansk Fotografisk Forening.—Established April 5, 1879. Place of Meeting, Haandveerkerforeningen, Kronprinsensgade 7, Kjöbenhavn. Carl Sonne, President. U. C. Bauer, Vice-President. Max Schon, Committee. O. Gjörup, Treasurer. J. Lanerberg, Kongens Nytorv 13, Kjöbenhavn, K., Secretary.

Deutsche Gesellschaft von Freunden der Photographie in Berlin.—Meldungen zum Beitritt für die Deutsche Gesellschaft von Freunden der Photographie nehmen die Mitglieder des Vorstandes entgegen und versenden dieselben auf Wunsch die "Satzungen" der Gesellschaft. Näheres durch den Schriftführer Herrn Direktor Schaltz-Hencke, Lette-Institut, Berlin S.W., Königsgrätzer-strasse 90, Der Jahresbeitrag beträgt M.20,00. für Auswärtige jährlich M.14.

Deutscher Photographen Verein.—Established December 29, 1876.—Place of Meeting, Weimar. K. Schwier, President. E. Sonntag, Vice-President. C. Kesselhuth, Hildesheim; Ferd. Dyck, Luxemburg; Herbert Rosenthal, Guben; Joh. Gaedicke, Berlin, Committee. K. Schwier, Treasurer. C. Kesselhuth, Hildesheim, Secretary. Business communications to be addressed to K. Schwier, Weimar.

Dresdner Gesellschaft zur Förderung der Amateur-Photographie Dresden.—Established 1897. Meetings held at the Vereinshaus, 17 Zinzendorfstrasse. E. Frohne, President. Hermann Schnauss, Vice-President. M. Hermann, Treasurer. Rob. Renger-Patzsch, Hon. Secretary. All letters, &c., should be addressed to the President (Herr E. Frohne), 24 Schumannstrasse, Dresden.

Fachverein der Photographen zu Berlin (Abtheilung des Deutschen Photogr. Gehilfen Verbandes).—Established December 1, 1893. Gustav Camphausen, President. Paul Schützman, Vice-President. Eduard Günther, Treasurer. Kuzelowsky, Secretary.

Haarlemsche Amateur Fotografen Club.—Established 1891. Place of Meeting, Haarlem Societie Vereeniging. N. van der Sleen, President. Maurits H. Binger, Treasurer. Frans Huijsser, Secretary.

Münchener Photographische Gesellschaft.—Established 1879. Place of Meeting, München. Adalbert Werner, President. Otto Wernhard, Treasurer. E. Kieser, Secretary. Address of Society, Deutsches Haus, Carlplatz, München.

Nijmeegsche Amateur Fotografen Vereeniging, M.L.—Established December, 23, 1893. Meetings held at the Café Meurs, Groote Straat, 5. Jacq Knepers, President. J. A. Vijftigschild, Committee. F. van de Graaff, Treasurer. C. T. Baron van Hemert tot Dingshof, St. Annalaan 41, Secretary.

CONTINENTAL PHOTOGRAPHIC SOCIETIES.—*continued.*

Photo Club de Paris.—Established 1888. Place of Meeting, 44 Rue des Mathurins. Maurice Bucquet, President. Emmanuel Mathieu, Vice-President. MM. Bucquet, E. Mathieu, P. Bourgeois, P. Naudot, H. Guérin, A. Darnis, M. Binder, R. Demachy, P. Gers, C. Puyo, A. Toutain, Committee. Henri Guérin, Treasurer. Paul Bourgeois, 80 Boulevard, Malesherbes General Secretary. Paul Naudot, Secretary.

Photographische Gesellschaft.—Established 1861. Place of Meeting, Wien. Dr. T. M. Eder, President. Robert Sieger, Vice-President. Wilhelm Burger, Georg Fritz, Michael Frankensteln, Arthur Baron Hübl, Wilhelm Müller, Albert Eder von Obermayer, Max Perlmütter, Karl Pietzner, Josef Ungar, Eduard Valenta, Committee. Ludwig Schrank, Treasurer. Alexander Angerer, Wien, II., Karmelitergasse, 7, Secretary.

Photographische Gesellschaft, Hamburg, Altona.—Established November 4, 1873. Place of Meeting, Hamburg, Jungfernstieg, 40. F. A. Dahlström, President. Willy Wilcke, Vice-President. C. Färber, Treasurer. S. Hamann, Secretary. Address of Society, F. A. Dahlström, Hamburg, Zeughausmarkt.

Photographischer Verein zu Berlin.—Established 1863. Place of Meeting, Berlin, Architecten Vereinshaus. Paul Grundner, President, T. Reichard, Vice-President. T. C. Schaarwächter, Dr. S. Steinschneider, Paul Schückert, Hpsm, u. Dr. Himly, Dr. A. Mietho, Dr. A. Heseckel, and F. Cornand, Committee. E. Martini, Treasurer. Director Schultz-Hencke, Berlin, S.W., Königgrätzerstrasse, P.V., Secretary.

Société Française de Photographie.—Established 1854. Place of Meeting, 76 Rue des Petits Champs. M. Janssen, President. Général Sebert et MM. Bardy et Bordet, Vice-Presidents. MM. Balagany, Colson, Davanne, Drouet, Fribourg, Gauthier-Villars, Hainque de Saint-Senoch, Houdaille, Londe, Rolland, Thouroude, Vallot, Committee. E. Audra, Treasurer. S. Pector, Secretary, 9 Rue Lincoln, à Paris, 8e Arrondissement.

Société Genevoise de Photographie.—Established 1879. Meetings are held at Grand Mézel 1, Genève. John Bosson, President. Dr. A. Mazel, Vice-President.

Société Nantaise de Photographie.—Established 1881. M. du Hanley, Lient-Colonel, President. M. Toubanc, Vice-President. Ch. Planté, H. Bureau, P. du Minehy, Committee. M. Tassain, Treasurer. Paul Crémant, Rue d'Alger, 43, Nantes, Secretary, and Pierre Courant, Assistant Secretary. Réunion le premier vendredi de chaque mois, au Cercle des Beaux-Arts.

Société Photographique, d'Arcachon.—Established 1899. Place of Meeting, 10 Rue du Casino, Arcachon. Capitaine Billoque, President. L. Escarragnel and Docteur Hameau, Vice-Presidents. M. de Marc, Treasurer. M. Dumora, Secretary.

Société Photographique Professionnelle.—Established 1878. Place of Meeting, Place St. Gervais, 6, à Genève. E. Dovaz, President. Charles Racine, Vice-President. Louis Barral, Treasurer. Antoine Chevalley, Siège de la Société, Secretary.

Société Versaillaise de Photographie.—Established 1884. Séances de la Société les premiers Mardis de chaque mois à la Mairie à 8 heures et demie du soir. Maurice Bucquet, President. L. Ottenheim, Vice-President. Comité d'administration Committee. M. Gavin, Treasurer. Jessé Cure'y, 20 Rue de Provence, Versailles, Secretary.

Sploro Photo Club Porto Alegre, Rio Grande do Sul, Brazil.—Established 1888. Juvenal Leal, President. Dr. Arthur Pinto da Rocha, Vice-President. Luiz Nascimento Ramos, Treasurer. Dr. Jose Paranhos, Secretary. Luiz Manuel de Souza, Waldemar Barcellos, and Dr. Conrad Penafiel, Council.

Verein zur Förderung der Photographie zu Berlin.—Established 1869. Martin Kiesling, Rittmeister a. d. President. Dr. L. Brandt, Wirkl. Geheim. Ober-Regierungsrat, Vice-President. W. Dieskau, Dr. L. Eillon, H. Haberlandt, Dr. A. Heseckel, A. Loescher, F. Quidde, Dr. Statius, H. Stegemann, Committee. Gustav Schmidt, Treasurer. Paul Hanneke, Berlin, W., Winterfeldtstrasse, 35, Secretary.

Verein zur Pflege der Photographie und verwandter Künste.—Established 1875. Place of Meeting, Hotel and Restaurant Taunus, gr. Backenheimerstrasse. Prof. F. Schmidt, Durlach, Baden, President. H. Maas, Frankfurt-on-Main, Vice-President. W. Pollot, Darmstadt; W. Husenbeth, Frankfurt-on-Main; H. Junior, Frankfurt-on-Main; Dr. C. Kleinschmidt, Darmstadt; Fr. Breuning, Hanau-on-Main; W. Kuntzemüller, Baden-Baden; Camillo Ruf, Freiburg, Baden, Committee. C. Boettcher, Frankfurt-on-Main, Treasurer. Theodor Haake (Messrs. Haake and Albers), 36 Kaiserstrasse, Frankfurt-on-Main.

AMERICAN PHOTOGRAPHIC SOCIETIES.

Agassiz Association, Manhattan Chapter (Photographic Section), New York.—Established 1881. Meetings held at 141 East Fortieth Street, New York City. C. F. Groth, President. C. Kromm, Vice-President. C. F. Groth, R. Kitchelt, E. B. Miller, W. S. Miller, H. T. Rowley, H. Brennich. F. G. Fruhan, Miss M. Leeson, Miss H. Hargrove, Committee. W. S. Miller, Treasurer. E. B. Miller, 141 East Fortieth Street, New York City. Corresponding Secretary.

Akron Camera Club.—Meetings are held at residences of members on the second Tuesday of each month. Edward A. Terrass, President. Henry Canfield, Vice-President. Frank Adams, Treasurer. Margaret Mitchell, 150 South Summit Street, Akron, Ohio, U.S.A., Secretary.

Albany Camera Club.—Organised 1887, Incorporated 1891. Meetings held at the Club House, 72 Chapel Street. Colonel Augustus Pruyn, President. Charles W. Reynolds, Vice-President. President, Vice-President, Secretary, and Treasurer, *ex-officio*, and Otto J. Stahl, Herrard P. Moore, R. S. Oliver, L. H. Neuman, S. C. Main, Henry Popp, C. L. Palmer, C. A. Van Allen, Board of Directors. Dr. T. L. Carroll, Treasurer. M. H. Rochester, c/o The Embossing Company, Secretary. Annual meeting first Friday in April.

Amateur Photographic Association.—Established December 29, 1887. Meetings held at 916 Broad Street. William S. Monk, President. S. A. Sexton, Vice-President. Miss Mary E. Keipp, Miss Mamie Ware, Gray Vaughan, W. F. Bailey, Committee. Captain S. Orlando Trippe, Selma, Dallas County, Alabama, Secretary and Treasurer.

American Institute (Photographical Section).—Established 1859. Meetings held at 19 and 21 West Forty-fourth Street, near Fifth Avenue. O. G. Mason, President. Robert A. B. Dayton, Vice-President. James Y. Watkins, Treasurer. John W. Bartlett, M.D., F.R.P.S., 149 West Ninety-fourth Street, New York City, N.Y., U.S.A., Secretary.

American Lantern Slide Interchange.—Established 1885. Meetings held at 361 Broadway, New York. F. C. Beach, General Manager. F. C. Beach, W. H. Cheney, W. H. Rau, John P. Zenner, Herbert F. Smith, Board of Managers. The Interchange consists of thirty American and Canadian Clubs, among which are exchanged a set of 100 selected lantern slides monthly for exhibition and educational purposes. Annual meeting is held in November of each year, when 2,000 slides are examined and arranged in sets for use.

Atlantic City Photographic Society.—Established 1895. Meetings held at Atlantic City, N.J. Herbert N. Morse, President. Ferdinand Stodler, Vice-President. Leonard Dalger, Treasurer. Herbert Somers, 25 S Indiana on Atlantic City, N.J., Secretary.

Bethlehem Photographic Society.—Established January 1894. Meetings held at the residences of members. F. McIntosh, President. Professor J. T. Hamilton, Vice-President. The Executive Committee is composed of the five Officers of the Society. E. A. Ran, Lantern Slide Director. A. G. Kemover, Treasurer. R. P. Stout, 332 Market Street, Bethlehem, Pa.

Birchwood Beach Camera Club.—Established 1900. Meetings held at Harbert, Michigan, U.S.A. W. Bradford, President. M. L. Sizer, Harbert, Michigan, Secretary.

AMERICAN PHOTOGRAPHIC SOCIETIES—continued.

Boston Camera Club.—Established 1881. Meetings held at the Club Rooms, 50 Bromfield Street, Boston, Mass. William R. Richards, President. Frederick S. Anable, Chas. H. Currier, Francis H. Manning, Vice-Presidents. The Officers and Dr. Percy E. Brown, Owen A. Eames, George H. Goodhue, Walter B. Swift, Gurdon Russell Fisher, William P. Robinson, Committee. Charles H. Chandler, Treasurer. Charles Hall Perry, 50 Bromfield Street, Boston, Mass., U.S.A.

Bridgeton Camera Society.—Established 1890. Meetings are held at the Bridgeton Cumb. Company, New Jersey. Henry W. Scull, President. Sidney H. Ogden, Vice-President. Charles C. Woodruff, Emerson B. Gamson, Frank E. Riley, Committee. Hugh L. Reeves, Treasurer. James Boyd Patter, Bridgeton, N.J., Secretary.

Brockton Camera Club.—Established April, 1894. Meetings are held at Room 1, Smith Building, Center Street. Robert E. Brayton, President. A. L. Evans, Dr. J. S. Thorndike, Vice-Presidents. The Officers, and C. H. Lawrence, G. W. Laring, S. H. Eaton, E. F. Stacey, E. W. Farwell, Committee. C. L. Perry, Treasurer. E. W. Farwell, Wyman Street, Brockton, Mass., U.S.A., Secretary.

Brooklyn Academy of Photography.—Incorporated 1888. Meetings held at 177 Montague Street, Brooklyn, N.Y., U.S.A. S. B. Price, M.D., President. Alex. M. Cook and Wm. Bogart Walker, Vice-Presidents. John Merritt, M.D., Sherman Esselstyn, C. G. Balmano, Edward Esmonde, S. L. Hodges, Trustees. Russell E. Prentiss, Curator and Librarian. A. S. Ingram, Treasurer. H. M. Valentine, Recording Secretary. J. M. Tallman, 166 McDonough Street, Brooklyn, N.Y., U.S.A., Corresponding Secretary.

Brooklyn Institute of Arts and Sciences (Department of Photography.—Established 1887. Meetings held at 201 Montague Street, Brooklyn, New York. Charles H. Morse, President. William J. Bryant, Vice-President. Charles H. Morse (Chairman), J. W. Kent, W. J. Bryant, J. H. Norris, J. C. Oswald, William C. Peckham, F. A. Perret, A. C. Ruprecht, Mrs. C. H. Burdett, Mrs. E. W. Maddren, Executive Committee. John H. Norris, Treasurer. A. C. Ruprecht, 379 Hancock Street, Brooklyn, New York, U.S.A., Secretary.

Buffalo Camera Club.—Established 1888. Meetings held at Franklin Street. John A. Stein, President. Harlow H. Boyce and H. Wilson Saunders, Vice-Presidents. John A. Stein, Harlow H. Boyce, H. Wilson Saunders, William G. Houck, John P. Zenner, Conrad L. Baer, Philip J. Knapp, Henry H. Gurnther, C. R. Knapp, James Savage, Louis F. Jansen, Louis B. Hart, Committee. Conrad L. Baer, 1 Genesee Street, Buffalo, N.Y., Secretary and Treasurer.

California Camera Club.—Established March 18, 1890. Meetings held at the Academy of Sciences Building, San Francisco, California. W. B. Webster, President. H. B. Hosmer and J. J. Lermen, Vice-Presidents. The Officers, and G. Knight White, J. R. Gwynn, F. C. Bangs, H. L. Byrne, Directors. I. O. Crosseup, Librarian. E. G. Eisen, Treasurer. W. E. Palmer, Academy of Sciences Building, San Francisco, California, Secretary. Chas. A. Goe, Academy of Sciences Building, San Francisco, California, Corresponding Secretary.

Camera Club of New York.—Established May 7, 1896. Meetings held at 3 West Twenty-ninth Street, New York City. C. H. Crosby, President. J. Edgar Bull, Vice-President. C. H. Crosby, J. Edgar Bull, H. B. Hart, Wm. E. Wilmerding, H. H. Man, Chas. J. Berg, C. S. McKune, J. C. Vail, F. C. Elgar, Board of Trustees. Wm. E. Wilmerding, Treasurer. H. B. Hart, West Twenty-ninth Street, New York City, Secretary.

AMERICAN PHOTOGRAPHIC SOCIETIES—*continued.*

Camera Club of Mount Vernon.—Established 1895. Meetings are held at Studio of W. F. Slight, Fourth Avenue, Mount Vernon, New York, U.S.A. Miss Mary E. Jennings, Secretary.

Camera Club of the University of Nebraska.—Established 1892. Meetings held at the Chemical Laboratory of the University of Nebraska, corner of Twelfth and R. Streets, Lincoln, Neb., U.S.A. Miss Adaline Quaintance, P. O. Box 675, Lincoln, Neb., U.S.A., Secretary and Treasurer.

Camera Club of the University of Pennsylvania.—Established 1889. Meetings held at the College Hall, University of Pennsylvania, Thirty-sixth Street and Woodland Avenue, Philadelphia, Pa. Chas. R. Hinchman, 3655 Chestnut Street, Philadelphia, Pa., U.S.A., Secretary.

Camerads.—Reorganised April 24, 1890. Meetings held at corner Church and Neilson Streets. Geo. K. Parsell, President. J. Artur Blish, Vice-President. William Macom, D.D.S., James Bradley, Hon. Geo. A. Veighmann, Committee. C. V. Myer, Treasurer. Harvey Iredell, D.D.S., Lock Box 34, Secretary.

Capital Camera Club of Washington, D.C.—Established May, 1891. Meetings held at 1010 F Street. Dr. W. P. Herbst, President. C. E. Fairman, Vice-President. Dr. W. P. Herbst, C. E. Fairman, W. F. Peabody, W. C. Babcock, E. B. Thompson, E. J. Daw, W. S. Davenport, J. W. L. Dillman, H. K. Hickey, W. H. E. Reinecke, Dr. W. E. Dieffenderfer, Misses K. S. Curry, Julia Bullock, R. L. Webster, Board of Directors. W. C. Babcock, Treasurer. W. F. Peabody, Secretary. Miss K. S. Curry, Corresponding Secretary.

Central Camera Club, Brooklyn Y.M.C.A.—Established January 1, 1888. Meetings held at 502 Fulton Street, Brooklyn, N.Y. William H. Lowery, President. James P. Allen, Vice-President. Charles Kuhn, Treasurer. Rud. Gebeth, 19 Hudson Ave., Brooklyn, N.Y., Secretary.

Chautauqua Photographic Exchange Club.—Established 1888. C. M. Fitzgerald (Georgetown, California), President. Miss C. L. Pierce, Elmhurst, Riverside, Conn., U.S.A., Secretary and Treasurer.

Chicago Society of Amateur Photographers.—Established December, 1886. Meetings held at the Art Institute, Chicago, Illinois. Geo. W. Leighton, President. Louis A. Lamb, Vice-President. Herman C. Knoke, Treasurer. E. W. Thomas, 10230 Lowe Avenue, Chicago, Illinois.

Cleveland (Ohio) Camera Club.—Established January 25, 1887. Meetings held at 5 Euclid Avenue on the first and third Tuesday evenings of each month at Eight p.m. The Annual Meeting is held on the first Tuesday evening in January, unless that Tuesday is the 1st of January, in which case it is deferred until the third Tuesday. William Ogler, President. Charles Potter, Vice-President. William Dorn, Treasurer. R. Dayton, M.D., 1202 Willison Avenue, Cleveland, Ohio, U.S.A., Secretary.

Colorado Camera Club.—October 26, 1891. Meetings held at the Club Rooms, 1230 Sixteenth Street, Denver, Colorado, U.S.A. Captain H. D. Smith, President. George L. Beam, Vice-President. Captain H. D. Smith, Thos. A. Morgan, C. A. Yont, C. F. Reed, Geo. A. Green, Major Wm. Cooke Daniels, Geo. L. Beam, Board of Directors. George A. Green, Treasurer. George L. Beam, 1230 Sixteenth Street, Denver, Colorado, U.S.A.

Columbia College (N. Y.) Amateur Photographic Society.—Established 1886. Meetings held at Columbia College twice a month. Henry R. Taylor, President. Dwight Taylor, Treasurer. H. M. Brookfield, Secretary

AMERICAN PHOTOGRAPHIC SOCIETIES—*continued.*

Columbian College (Washington, D.C.) Camera Club.—Established 1888. Ordinary Meetings at Columbian College, Washington, D.C., every Wednesday afternoon. Allan J. Houghton, President. Edwin W. Ashford, Vice-President. W. B. Asmussen, Librarian. A. J. Houghton, Treasurer. Charles P. Spooner, Secretary.

Columbia Photographic Society.—Established 1889. Meetings held at 1811 North Broad Street, Philadelphia, Pa., U.S.A. Dr. G. J. R. Miller, President. P. MacCaffray and Frank D. Long, Vice-Presidents. E. R. Schmidt, H. J. Pagen, R. W. Pierce, J. S. Newman, Daniel Baker, Chas. H. Smith, W. C. Motteram, Board of Directors. H. Polwell, Treasurer. H. S. Anderson, 702 West York Street, Philadelphia, Pa., Secretary.

Columbus (Ohio) Camera Club.—Established October 6, 1884. Rooms Y.M.C.A. Building. Regular Meetings, third Thursday of each month except July and August at half-past Seven p.m. Annual Meeting, third Thursday of December. John Field, President. C. H. Doty, Vice-President. C. S. Bradley, Treasurer. W. B. Kimball, 32 East Spring Street, Columbus, Ohio, U.S.A., Secretary.

Corliss Art and Camera Club.—Established May 1, 1896. Meetings held at the State Street Corliss Memorial Building. J. S. McDaid, President. O. P. Gould and J. H. Wheeler, Vice-Presidents. Edgar F. Noyes, Treasurer. Miss A. B. Brown, Newburyport, Mass., c/o N. N. Jones, Secretary.

Cortland Camera Club.—Established 1895. Meetings held at Y.M.C.A. Rooms. L. M. Alexander, Lock Box 213, Cortland, N.Y., U.S.A., Secretary and Treasurer.

Delaware Camera Club.—Established 1891. Headquarters in its Club Rooms in the Equitable Building, Wilmington, Delaware. Regular Meetings are held on the first Thursday of each month. John M. Rogers, President. Miss Rachel S. Howland and Geo. A. Elliott, Vice-Presidents, John C. Phillips, 803 Franklin Street, Wilmington, Del., U.S.A., Secretary.

Detroit Camera Club.—Established February 17, 1897. Meetings held at 106 Miami Avenue. E. W. Sprague, President. A. D. Noble, jun., Vice-President. E. D. Roberts, O'Brien Atkinson, R. A. Field, J. E. Scott, F. B. Wood, A. D. Noble, W. S. Thomas, E. W. Sprague, W. E. Winckler, Miss Davidson, Executive Committee. W. E. Winckler, 106, Miami Avenue, Secretary and Treasurer.

Detroit Lantern Club.—Established January, 1891. Meetings held at the Museum of Art, Hastings Street and Jefferson Avenue, Detroit, Mich. Frank E. Kirby, President. A. D. Noble, jun., Director. D. Farrand Henry, 52 Woodward Avenue, Detroit, Mich., U.S.A., Secretary and Treasurer.

Elizabeth Camera Club.—Established 1893. Meetings held at 96 Broad Street. Jas. A. Knowles, President. A. P. Campbell, Vice-President. Dr. E. D. Frost, T. F. McCarty, J. G. Green, John Ball, E. W. Smith, A. P. Campbell, A. N. Lakens, Committee. James A. Knowles, Treasurer. John Ball, 96 Broad Street, Elizabeth, N.J., U.S.A., Secretary.

Frankford Camera Club of Philadelphia.—Established October, 1883. Meetings are held at Knight's Industrial and Beneficial Institute, Frankford, Philadelphia. B. Antrim Haldeman, President. John B. Lomax, Vice-President. Benjamin S. Thorp, Harry E. Crankshaw, John B. Lomax, Miss M. C. Shallcross, Miss M. R. Rover, and, *ex officio*, the President and Secretary, Committee. Harry E. Crankshaw, Treasurer. John M. Justice, 5016 Penn Street, Frankford, Philadelphia, Pa., U.S.A., Secretary.

AMERICAN PHOTOGRAPHIC SOCIETIES—continued.

Harvard Camera Club.—Established 1889. Headquarters, Harvard University, Cambridge, Mass. Annual Meeting, June. Meetings monthly. Vernon Maunse, President. C. P. M. Rumford, Vice-President. Percy Emerson Brown, 11 Weld Hall, Cambridge, Mass., U.S.A., Secretary and Treasurer.

Haverhill Camera Club.—Established February, 1898. Meetings held at Daggett Building. George J. Kaula, President. Jesse M. Pettee, Vice-President. Wm. H. Burke, Alexander D. Smith, and Officers, Committee. Alfred E. Collins, c/o Haverhill Savings Bank, Haverhill, Mass., U.S.A., Secretary and Treasurer.

Hoboken Camera Club.—Established March 22, 1889. The Regular Meetings of the Club take place the first Tuesday of each month. The Board of Governors meet the third Friday of each month. The Annual Meeting of the Club takes place the first Tuesday in March, when the election of officers takes place for the ensuing year. All Meetings are held at 1036 Park Avenue, Hoboken, N.J. A. J. Thomas, President. C. Sudhaus, Vice-President. Three Trustees (W. Schrader, A. Beyer, E. E. Wooley), all the Officers of the Club, the House Committee (F. A. Muench), and the Entertainment Committee, Board of Governors. William Allen, Custodian. H. J. Kulenbach, Treasurer. A. L. Smith, 1045 Bloomfield Street, Hoboken, N.J., U.S.A., Secretary.

International Photographic Print Exchange.—Established May, 1893. A Postal Photographic Club of twenty members. Walter Sprange, Beach Bluff Hall, Swamp Scott, Mass., U.S.A., Secretary.

Irrington (N.J.) Art and Camera Club.—Established 1892. Meetings are held at Springfield and Union Avenues, Irvington, N.J., U.S.A. Edwin D. Harrison, President. F. H. Morrell, Vice-President. James Peckwell, jun., Treasurer, Melton Tompkins, Secretary.

Lancaster Camera Club.—Established May 3, 1895. Meetings held at Lancaster, Pa., U.S.A. Wm. S. Gleim, President. Wm. A. Heitshu, Vice-President. Charles A. Sauber, 221 South Queen Street, Lancaster, Pa., Secretary and Treasurer. F. A. Demuth, 114 East King Street, Lancaster, Pa., Corresponding Secretary.

Louisville Camera Club.—Established 1888. Meetings held at North-east corner of Fourth Avenue and Jefferson Street, Louisville, Ky. R. L. Stevens, 1100 West Main Street, Louisville, Ky., U.S.A., Secretary.

Lowell Camera Club.—Incorporated 1892. Meetings held at Central Block. Paul Butler, President. William P. Atwood, Vice-President. A. H. Sanborn, Treasurer. George A. Nelson, 109 Sherman Street, Lowell, Mass., Secretary.

Lynn Camera Club.—Established January 1, 1888. Incorporated December 20, 1889. Regular Meetings, first Tuesday in each month. Annual Meeting, first Tuesday in January. All Meetings held at the Club House, 42 Broad Street. William H. Drew, President. J. N. Smith, Vice-President. W. H. Drew, J. N. Smith, J. W. Gibboney, A. J. Purinton, E. F. Bacheller, A. H. Carsley, W. B. Gifford, W. A. Pevear, Committee. E. F. Bacheller, Treasurer. C. A. Lawrence, Club House, 42 Broad Street, Lynn, Mass., U.S.A., Secretary.

Memphis Camera Club.—Established 1893. Meetings held at the Y.M.C.A. Buildings. S. J. Latta, President. A. Wardle, Vice-President. S. J. Latta, A. Wardle, Geo. O. Friedel, M. Stewart, E. I. Pinnel, Directors. Geo. O. Friedel, 165 Gayoso Street, Memphis, Tenn., U.S.A., Secretary and Treasurer.

AMERICAN PHOTOGRAPHIC SOCIETIES—*continued.*

Minneapolis Camera Club.—Incorporated 1892. Meetings held at the Public Library. H. E. Murdock, President. F. V. Haven, Vice-President. President, Vice-President, Secretary, Treasurer, Geo. H. Beach, E. J. Kimball, A. S. Williams, H. E. Peck, Oscar Tucker, L. J. Skinner, Board of Directors. C. F. Potter, jun., Treasurer. C. J. Hibbard, 323 Hennepin Avenue, Minneapolis, Minn., Secretary.

Mystic Camera Club.—Established June 4, 1889. Meetings held at 2 Ashland Street, Medford, Mass. John F. Wade, President. L. E. Shattuck, Vice-President. J. F. Wade, L. E. Shattuck, Everett Scammon, Chas. A. Clark, Edward B. Dennison, J. F. W. Ames, Will C. Eddy, Committee. Charles A. Clark, Treasurer. Will C. Eddy, 18 Summer Street, Medford, Mass., Secretary.

Newark (Delaware) Camera Club.—Established 1893. Meetings held at Newark, Delaware. Professor F. D. Chester, President. G. H. Powell, Vice-President. F. W. Curtis, Newark, Delaware, U.S.A., Secretary and Treasurer.

New Britain Camera Club.—Established 1892. Headquarters, 210 Main Street. Annual Meeting, January. Meetings, second and fourth Tuesdays in each month. E. F. Porter, President. G. A. Reckard, Vice-President. F. W. Wood, 273 Main Street, New Britain, Conn., U.S.A., Secretary and Treasurer.

New England Lantern Slide Exchange.—Established 1890. Will C. Eddy, 88 Marshall Street, Medford, Mass., U.S.A., Secretary.

New Orleans Camera Club.—Established December 17, 1886. Meetings are held at 712 Union Street, New Orleans, La. Hon. Bernard C. Shields, President. W. Gowland, Vice-President. William Grimshaw, Treasurer. M. V. Haulard, 1729 Bienville Avenue, New Orleans, La., U.S.A., Secretary.

Newton Camera Club.—Established 1893. Meetings held at the Club House Brookside Avenue, Newtonville, Mass., U.S.A. F. O. Stanley, President. E. E. Snyder, Vice-President. Austin S. Kilburn, West Newton, Mass., U.S.A., Secretary.

Norwalk Camera Club.—Established November 3, 1897. Mrs. W. V. Prinliss Dingen, President. H. W. Van Sciver, Vice-President. Harry Hall Finch, Bayview Avenue, So. Norwalk, Conn., U.S.A., Secretary and Treasurer.

Old Colony (Rockland, Mass.) Camera Club.—Established February 1, 1890. Meetings held at Arnold Building, Liberty Street. David Smith, President. Emery H. Jenkins, Vice-President and Treasurer. David Smith, Rockland, Mass., U.S.A., Secretary.

Omaha Camera Club.—Established 1894. Meetings held at 1312 Farnam Street, Omaha, Neb. W. Durnall, 1312 Farnham Street, Omaha, Neb., U.S.A., Secretary.

Oneida Camera Club.—Established March 1, 1894. Meetings are held at the Club Rooms, Post-office Building, Oneida, N.Y. B. S. Teale, President. George R. Hanson, Vice-President. Jacob Standt, Wesley Fisher, C. M. Kingsbury, Committee. Albert Dygert, Treasurer. C. R. Baker, P.O. Block, Oneida, N.Y., U.S.A., Secretary.

Orange (N.J.) Camera Club.—Organised March 21, 1892. Meetings held on 5th and 20th of each month. F. J. Gould, President. D. S. Plumb, Vice-President. W. H. Cheney, Chairman of Lantern Slide Committee. E. J. Apgar, Chairman of House Committee. F. L. Fieger, Chairman of Membership Committee. T. J. Preston, jun., Chairman of Print Committee. Hermann Joerns, Chairman of Finance Committee. E. S. Butterfield, Treasurer. W. H. Mason, Secretary. Executive Committee composed of above nine persons.

AMERICAN PHOTOGRAPHIC SOCIETIES—continued.

Oregon Camera Club.—Established January 14, 1895. Meetings held at the Club Rooms, Oregonian Building, Portland, Oregon. Will H. Walker, President. F. C. Cover, Vice-President. Will. H. Walker, F. C. Cover, Milton P. Goldsmith, F. A. French, Hugo B. Goldsmith, Executive Committee. F. A. French, Treasurer. Milton P. Goldsmith, P.O. Box 93, Portland, Oregon, U.S.A., Secretary.

Paterson Camera Club.—Established 1893. Meetings are held at 9 Lake Street. C. M. Giles, President. H. W. Gledhill, Vice-President. Wm. M. Moore, Treasurer. Chas. D. Cooke, Cooke Locomotive Works, Paterson, N.J., U.S.A., Secretary.

Photographers' Association of America.—Established 1880. Place of meeting in 1901, Detroit, Michigan. E. B. Core, President. D. D. Spellman, First Vice-President. Henry Klein, Second Vice-President. The combined Officers form the Executive Board. F. R. Barrows, Treasurer. J. George Nussbaumer, 500 Main Street, Buffalo, New York, Secretary.

Photographers' Association of Iowa.—Established 1889. Meetings held at Des Moines, Iowa. G. S. Coman, President. E. S. Frey, First Vice-President. W. H. Jacobs, Second Vice-President. Theo. A. Brown, Treasurer. J. R. Hall, Monroe, Iowa, U.S.A., Secretary.

Photographers' Association of Ohio.—Office of Executive Committee, Hamilton, Ohio. A. L. Bowersox, President. George H. Barnum, Springfield, Ohio, U.S.A., Secretary.

Photographers' Association, State of Missouri.—Established 1894. Meetings held at St. Louis, Mo., 1899. George W. Curtiss, President. F. Tenby, jun., and C. Stewart, Vice-Presidents. Miss Belle Johnson, Treasurer. Fred. Hammer, jun., 1545 Broadway, St. Louis, Mo., Secretary.

Photographic Club of Baltimore City.—Established April 29, 1885. Meetings held at New Club House, 870 Linden Avenue, Baltimore, Md., U.S.A. Percy M. Reese, President. Dr. J. E. Orrison, Vice-President. Dr. Frank Slothower, Dr. J. E. Orrison, Dr. B. M. Milkerson, James F. Ferguson, Percy M. Reese, A. Morris Tyson, James W. Bowers, jun., Charles A. Muller, Enoch M. Barker, Board of Directors. Enoch M. Barker, Treasurer. James W. Bowers, jun., 870, Linden Avenue, Baltimore, Md., U.S.A., Secretary.

Photographic Section of the Hartford Scientific Society.—Established February 18, 1885. Meetings held at 803 Main Street, Hartford, Conn. Professor A. L. Gillett, President. Professor A. L. Gillett, Eugene D. Field Chas. S. Blake, Herbert O. Warner, Ernest J. Hoskins, Committee. Chas. S. Blake, Treasurer. Eugene D. Field, 200 Beacon Street, Secretary.

Photographic Society of Philadelphia.—Founded in November, 1862. Meetings held at 10 South Eighteenth Street. Walter P. Stokes, President. Samuel Sartain and Anthony W. Robinson, Vice-Presidents. William S. Vaux, jun., Treasurer. Charles R. Pancoast, 1213 Filbert Street, Secretary. Board of Directors includes the above officers and the following members—C. Yarnall Abbott, Prescott Adamson, Henry Tatnall Brown, Joseph H. Burroughs, S. Hudson Chapman, Howard W. DuBois, George D. Firmin, Charles E. Frick, Morris E. Leeds, William H. Rau, William H. Roberts, William C. Stevenson.

Pittsburg Amateur Photographers' Society.—Organised 1885. Incorporated 1896. Meetings held at the Carnegie Library, Pittsburg, Pa. U.S.A. E. E. Keller, President. H. L. Christy, Vice-President. E. E. Keller, H. L. Christy, Mrs. S. A. Ammon, W. J. Boston, F. E. Gaither, F. T. Aschman, A. B. McVay, W. J. Hunker, J. H. Hunter, Board of Trustees. W. J. Hunker, Treasurer. J. H. Hunter, 520 Greene Street, Pittsburg, Pa., U.S.A., Secretary.

AMERICAN PHOTOGRAPHIC SOCIETIES—*continued.*

Pittsfield Camera Club.—Established 1890. C. G. Tompkins, President. Jas. F. Middleton, Vice-President. J. H. Musgrove, Treasurer. J. E. Colton, Pittsfield, Mass., U.S.A., Secretary.

Plainfield Camera Club.—Established 1889. Meetings held at the Club Gallery, Babcock Building, Walter H. Freeman, President. J. Hervey Doane, Vice-President. W. H. Freeman, Hervey Doane, H. H. Coward, Harold Serrell, George H. Fountain, Board of Directors. H. H. Coward, City National Bank, Plainfield, N.J., Secretary and Treasurer.

Portland (Maine) Camera Club.—Established 1891. Meetings held at the Club Rooms. Stanley P. Warren, M.D., President. C. T. Whipple, Treasurer. Frederick Fox, jun., 66 Union Street, Portland, Maine, U.S.A., Secretary.

Postal Photographic Club.—Established April, 1885. Albert J. Le Breton (Washington D.C.), President. F. O. Congdon, 120 Broadway, New York (Headquarters), Secretary and Treasurer.

Providence Camera Club.—Organised 1883. Incorporated 1889. Meetings held at 174 Weybosset Street, Providence, R.I. Christopher M. Lee, President. W. Penn Mather, Vice-President. O. L. Holt, Franklin W. Cummings, Frederick E. Brown, Mrs. E. E. Hill, John W. Auty, Arthur Winsor, R. Clyde L'Amoureux, D. Howard Thornton, Executive Committee. Edmund A. Darling, Treasurer. David Bangs Pike, Court House, Providence, R.I., Corresponding Secretary.

Putnam (Conn.) Camera Club.—Established January, 1888. Headquarters at its Club Rooms, Putnam, Connecticut. Regular Meetings are held on the first Friday in each month. The Annual Field Day occurs on the first Wednesday in June. George E. Dresser, President. Edward F. Whitmore, Treasurer. Eric H. Johnson, Putnam, Connecticut, U.S.A., Secretary.

Rutland Camera Club.—Established October, 1893. Meetings held at 149 South Main Street, Rutland, Vt. Cornele G. Ross, President. Cornele G. Ross, N. S. Marshall, V. F. Worcester, Committee. V. F. Worcester, 149 South Main Street, Rutland, Vt., Secretary and Treasurer.

Sacramento Camera Club.—Established 1895. Meetings held at the Club Rooms, 504 J Street. Ferdinand Kohler, President. S. B. Nourse, Vice-President. Ferdinand Kohler, S. B. Nourse, W. G. Woods, R. P. Burr, R. B. Prideaux, W. E. Cogswell, J. J. Gormley, Directors. R. P. Burr, Treasurer. W. G. Woods, 420 J Street, Sacramento, California, Secretary.

San Diego Camera Club. Established April, 1900. Meetings held at Sefton Block. Ford A. Carpenter, President. J. E. Slocum, Vice-President. Officers of Club, Committee. Professor F. W. Kelsey, Treasurer. E. L. Rector, San Diego, California, Secretary.

Schuylkill Camera Club.—Established July 5, 1889. Meetings are held at the Q.O.O.F. Hall, 103 Market Street, Pottsville, Pa. A. W. Sheaffer, President. Miss Elena Roads, Vice-President. The Officers are the Committee. W. L. Sheaffer, Treasurer. B. S. Simonds 1432 West Norwegian Street, Pottsville, Pa., Secretary.

Springfield Camera Club.—Meetings held at the Y.M.C.A. Building. J. D. Roscoe, President. Philip W. Lee, N. D. Copeland, House Committee. John W. Roberts, Springfield, Mass., Box 1016, Secretary.

AMERICAN PHOTOGRAPHIC SOCIETIES—continued.

Stevens (Hoboken, N.J.) Photographic Society.—Established 1880. Meetings held at the Stevens Institute, Hoboken, N.J. R. P. Jennings, President. — Ode, Vice-President. L. M. De Azeveda and Jos. Stehlin, Committee. Charles L. Wachter, Treasurer. E. C. Voorhees, Stevens Institute, Hoboken, N.J., U.S.A., Secretary.

St. Louis Camera Club.—Established 1885. Meetings held at 911 North Vandeventer Avenue. Walter H. Wilcox, President. M. T. Corwin, Vice-President. Charles M. Alexander, Chairman of the Lantern Slide Committee. H. B. Alexander, 4028 Westminster Place, St. Louis, Mo., U.S.A., Secretary and Treasurer.

St. Louis Photographic Society.—Established December, 1895. Meetings held in Y.M.C.A. Building, Grand and Franklin Avenue. Robert E. M. Bain, President. John B. Holman, Vice-President. Charles M. Alexander, 4028 Westminster Place, St. Louis, Missouri, U.S.A., Secretary and Treasurer.

St. Paul Camera Club.—Established May, 1899. W. Almont Gates, President. F. M. Saraway, Vice-President. B. J. Shipman, George S. Wilson, H. A. Adams, Trustees. J. W. G. Dunn, Treasurer. H. A. Seppen, N. P. Railway Building, St. Paul, Minn., Secretary.

Sunny Side Camera Club.—Established October 10, 1891. Meetings held at 5900 South Broadway, St. Louis, Mo. Berthold W. B. Blumenthal, President. Edmund Broch, Vice-President. B. W. B. Blumenthal, William A. Britchner, Charles Hendemuth, Algernon Blumenthal, Committee. William A. Britchner, 1235 South Broadway, St. Louis, Mo., U.S.A., Secretary and Treasurer.

Syracuse Camera Club.—Established 1886. Meetings held at University Buildings, Syracuse, N.Y. Professor F. L. Mead, President. Dan H. Sweet, Vice-President. F. L. Mead, Dan H. Sweet, E. D. Foote, J. E. Bierhardt, H. A. Snellgrove, Fred Rogers, J. H. Wilson, Geo. W. Standen, Board of Directors. J. E. Bierhardt, Treasurer. E. D. Foote, 441 O. C. S., Bank Buildings, Syracuse, N.Y., Secretary.

Tech Camera Club.—Established September, 1889. Meetings, bi-monthly, at half-past seven, p.m., in the Boynton Hall of the Polytechnic Institute, Worcester, Mass. Dark room and Printing room also at Boynton Hall. The purpose of the Meetings is to discuss photographic subjects and, as far as possible, to diffuse a knowledge of the science and art among the members of the Institute. The Executive Committee transact all business connected with the Club. H. J. Fuller, President. A. J. Smith, Vice-President. J. W. Higgins, 228 West Street, Worcester, Mass., U.S.A., Secretary and Treasurer.

Technology Photographic Society.—Established 1893. Meetings are held at Massachusetts Institute of Technology, Boylston Street, Boston, Mass. Herman A. Poppenhusen, President. Welles M. Partridge, Vice-President. President, Vice-President, Secretary, Treasurer, Frederick Kleinschmidt, Committee. Arthur C. Lawley, Treasurer. E. Johnson Loring, Mass. Inst. Tech., Boston, Mass., U.S.A., Secretary.

Topeka Camera Club.—Established September 5, 1894. Meetings held at members' homes. F. M. Tuckerman, President. Ralph H. Gaw, Vice-President. W. E. Culver, Treasurer. F. M. Tuckerman, 34 Santa Fe Building, Topeka, Kansas, Secretary.

Trenton Photographic Society.—Established January 1898. Meetings held at Room 11, Scott Building, N.J., U.S.A. S. S. Webber, President. Jas. S. Woolverton, D.D.S., Vice-President. All Officers and three active members, Trustees. William C. Lawrence, Treasurer. Grant Castner, 51, Bayard Street, Trenton, N.J., U.S.A. Secretary.

AMERICAN PHOTOGRAPHIC SOCIETIES—*continued*.

Valley Camera Club.—Established November, 1896. Meetings are held at Phoenix, R.I., U.S.A. Ward E. Smith, President. Ward E. Smith, F. J. Hoxie, J. Bancroft Lawton, Andrew Yorston, Everet Nichols, Executive Committee. F. J. Hoxie, Treasurer. J. Bancroft Lawton, Phoenix, R.I., U.S.A., Secretary.

Waterbury Photographic Society.—Established 1888. Meetings are held at Platt's Block, Waterbury, Conn. Oscar A. Ziglatzki, President. George F. Hodges, Vice-President. Henry T. Stedman, George H. Ward, George Husker, Executive Committee. Henry T. Stedman, Treasurer. Hollyday Emery, Waterbury, Conn., U.S.A., Secretary.

Watertown (N. Y.) Camera Club.—Meetings held at 4 Paddock Arcade, Watertown, N.Y. A. R. Wilson, President. George Mowe, Treasurer. C. A. Wilson, 2½ Public Square, Watertown, N. Y., U.S.A., Secretary.

Worcester Camera Club.—Re-established 1892. Meetings held at Walker Building, 405 Main Street, Worcester, Mass. Daniel F. Gay, 214 Main Street, Worcester, Mass., U.S.A., Secretary.

Young Women's Camera Club.—Established November, 1894. Meetings held at the Young Women's Christian Association Rooms, Minneapolis, Minn. Miss Mabel Jameson, President. Miss M. Bells Jeffery, Vice-President. Miss Minesoa Turnbull, Treasurer. Miss M. Eva McInty 1833 Portland Avenue, Minneapolis, Minn., U.S.A., Secretary.

WEIGHTS AND MEASURES.

APOTHECARIES' WEIGHT.

SOLID MEASURE.

20 Grains	= 1 Scruple	= 20 Grains.
3 Scruples	= 1 Drachm	= 60 „
8 Drachms	= 1 Ounce	= 480 „
12 Ounces	= 1 Pound	= 5760 „

FLUID.

60 Minims	= 1 Fluid Drachm,
8 Drachms	= 1 Ounce.
20 Ounces	= 1 Pint.
8 Pints	= 1 Gallon.

The above weights are those usually adopted in formulæ.

All Chemicals are usually sold by Avoirdupois Weight, in which there are 437½ grains to the ounce.

The Precious Metals, such as Silver and Gold, are sold by Troy Weight, containing 480 grains to the ounce.

FRENCH FLUID MEASURES, AND THEIR EQUIVALENTS
IN ENGLISH.

[See also other tables in this section.]

1 Cubic Centimètre	= 17 minims nearly.
3½ „ „	= 1 drachm.
28·4 „ „	= 1 ounce.
50 „ „	= 1 ounce, 6 drachms, 5 minims.
100 „ „	= 3 ounces, 4 drachms, 9 minims.
1000 „ „	} = 35 ounces, 1 drachm, 36 minims.
or 1 litre,	
= to 61 cubic inches	

The unit of French liquid measures is a cubic *centimètre*.

A cubic *centimètre* of water measures nearly 17 minims (16·896); it weighs 15·4 grains, or 1 *gramme*. A cubic *inch* of water weighs 252·5 grains.

The unit of French weights is the *gramme* = 15·4 grains; thus a drachm (60 grains) is nearly 4 grammes (3·88). An easy way to convert grammes into English weight is to divide the sum by 4, which gives the equivalent in drachms very nearly thus:—

Grammes.		Drachms.		Oz.	Drachm.	Grains
100	÷ 4	= 25	=	3	, 1	+ 43

FRENCH INTO ENGLISH FLUID MEASURES.

THE following table will prove to be sufficiently accurate for photographic purposes:—

1 cubic centimetre	=	17 minims	(as near as possible).
2 cubic centimetres	=	34	"
3	"	=	51 "
4	"	=	68 " or 1 drachm 8 minims.
5	"	=	85 " 1 " 25 "
6	"	=	102 " 1 " 42 "
7	"	=	119 " 1 " 59 "
8	"	=	136 " 2 drachms 16 "
9	"	=	153 " 2 " 33 "
10	"	=	170 " 2 " 50 "
20	"	=	340 " 5 " 40 "
30	"	=	510 " 1 ounce 0 drachm 30 minims.
40	"	=	680 " 1 " 3 drachms 20 "
50	"	=	850 " 1 " 6 " 10 "
60	"	=	1020 " 2 ounces 1 " 0 "
70	"	=	1190 " 2 " 3 " 50 "
80	"	=	1360 " 2 " 6 " 40 "
90	"	=	1530 " 3 " 1 " 30 "
100	"	=	1700 " 3 " 4 " 20 "

FRENCH INTO ENGLISH WEIGHTS.

1	gramme	=	15 $\frac{3}{5}$	grains.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
---	--------	---	------------------	---------	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

NEW METRIC WEIGHTS AND MEASURES.

[From the Journal of the Royal Photographic Society.]

IN accordance with a resolution passed by the Council of this Society, directing the publication, in the JOURNAL, of the Order in Council dated May 19, 1898, substituting a new table of imperial and metric equivalents for that set forth in Part. I. of the Third Schedule of the Weights and Measures Act, 1878, we give below an abstract from the new Schedule of such measures of weight, length, capacity, &c., which are in common use amongst photographers in this country.

Equivalents of Metric Weights and Measures in Terms of Imperial Weights and Measures.

LINEAR MEASURE.

1 Millimetre (Mm.) (1/1000th M.) =	0.03937 Inch.
1 Centimetre (1/100th M.) ... =	0.3937 „
1 Decimetre (1/10th M.) =	3.937 Inches
1 Metre (M.) =	{ 39.370113 Inches 3.280843 Feet 1.0936143 Yards
1 Dekametre (10 M.) =	10.936 Yards
1 Hectometre (100 M.) =	109.36 „
Kilometre (1000 M.) =	0.62137 Mile

SQUARE MEASURE.

1 Square Centimetre..... =	0.155 Square Inch
1 „ Decimetre (100 Sq. Centimetres) =	15.5 Square Inches
1 Square Metre (100 Square Decimetres) =	{ 10.7639 Square Feet 1.196 Square Yards

CUBIC MEASURE.

1 Cubic Centimetre =	0.061 Cubic Inch
1 „ Decimetre (C.D.) (1000 Cubic Centimetres) =	61.024 Cubic Inches
1 Cubic Metre (1000 Cubic Decimetres) =	{ 35.3148 Cubic Feet 1.307954 Cubic Yards

MEASURE OF CAPACITY.

1 Centilitre (1/100th Litre) ... =	0.07 G ll
1 Decilitre (1/10th Litre) ... =	0.176 Pint
1 Litre =	1.7598 Pint
1 Dekalitre (10 Litres) =	2.2 Gallon

WEIGHT.		<i>Avoirdupois.</i>
1 Milli ⁴ gramme (1/1000th Grm.)	=	0.015 Grain
1 Centigramme (1/100th Grm.)	=	0.154 „
1 Decigramme (1/10th Grm.)	=	1.543 Grains
1 Gramme (1 Grm.)	=	15.432 „
1 Dekagramme (10 Grm.)	=	5.644 Drachms
1 Hectogramme (100 Grm.)	=	3.527 Ounces
1 Kilogramme (1000 Grm.)	=	{ 2.2046223 lbs. or
1 Quintal (100 Ki ^o g)	=	{ 15432.3564 Grains
	=	1.968 Cwt.
		<i>Apothecaries'.</i>
1 Gramme (1 Grm.)	=	{ 0.2572 Drachm
	=	{ 0.7716 Scruple
	=	{ 15.432 Grains
		<i>Troy.</i>
1 Gramme (1 Grm.)	=	0.03215 Ounce

Equivalent of Imperial Weights and Measures in Terms of Metric Weights and Measures.

LINEAR MEASURE.

1 Inch	=	25.4 Millimetres
1 Foot	=	0.3048 Metre
1 Yard	=	0.914399 „
1 Mile	=	1.6093 Kilometre

SQUARE MEASURE.

1 Square Inch	=	6.4516 Square Centimetres
1 „ Foot	=	9.2903 „ Decimetres
1 „ Yard	=	0.836126 „ Metre
1 „ Mile	=	259.0 Hectares

CUBIC MEASURE.

1 Cubic Inch	=	16.387 Cubic Centimetres
1 „ Foot	=	0.028317 Cubic Metre
1 „ Yard	=	0.764553 „ „

MEASURES OF CAPACITY.

1 Pint	=	0.568 Litre
1 Quart	=	1.136 „
1 Gallon	=	4.5459631 Litres

APOTHECARIES' MEASURE.

1 Minim	=	0.059 Millimetre
1 Fluid Scruple	=	1.184 „
1 „ Drachm (60 Minims)	=	3.552 Millimetres
1 „ Ounce (8 Drachms)	=	2.84123 Centilitre
1 Pint	=	0.568 Litre

AVOIRDUPOIS WEIGHT.

1 Grain	=	0.0648 Gramme
1 Ounce	=	28.350 Grammes
1 Pound.....	=	0.45359243 Kilogramme
1 Hundredweight	=	50.80 Kilogrammes.

APOTHECARIES' WEIGHT.

1 Grain	=	0.0648 Gramme
1 Scruple (20 Grains)	=	1.296 Grammes
1 Drachm (3 Scruples)	=	3.888 "
1 Ounce (8 Drachms).....	=	31.1035 "

Note.—The Metre is represented by the distance marked by two fine lines on the iridio-platinum standard bar numbered 16, when at the temperature of 0° Centigrade. This bar is deposited with the Board of Trade. The metre is the only unit of metric measure of extension from which all other metric measures of extension, whether linear, superficial, or solid, shall be ascertained.

The Kilogramme is represented by the cylindrical iridio-platinum standard kilogramme weight numbered 18, which is deposited with the Board of Trade. The kilogramme is the only unit of metric weight from which all other metric weights, and all measures having reference to metric weight, shall be ascertained.

The Litre is represented by the capacity at 0° Centigrade of the cylindrical brass measure marked "litre, 1897" (which is deposited with the Board of Trade), and having a diameter equal to one-half its height. This litre at 0° Centigrade when full contains one kilogramme of distilled water at the temperature of 4° Centigrade, under an atmospheric pressure equal to that represented by a column of mercury 760 millimetres high at 0° Centigrade at sea-level, and at latitude 45°, the weighing being made in air, but reduced by calculation to a vacuum. It is the only unit of metric measure of capacity from which all other metric measures of capacity, as well for liquids as for dry goods, shall be ascertained.

POSTAL INFORMATION.

INLAND LETTERS.

The rates for Inland Letters are as follows:—

4 ozs. 1d.	10 ozs. 2½d.	16 ozs. 4d.
6 ozs. 1½d.	12 ozs. 3d.	18 ozs. 4½d.
8 ozs. 2d.	14 ozs. 3½d.	20 ozs. 5d.

and so on for greater weights at ½d. extra for every additional 2 ozs. No letter may exceed 24 in. long, 12 in. wide, or 12 in. deep. Letters posted unpaid are charged double postage on delivery; those insufficiently paid, double the deficiency.

EXPRESS DELIVERY.—Letters and parcels are accepted at most of the principal offices for express delivery, at an extra charge of 3d. for every mile or part. The cost of cab hire extra if required. The packet must be handed over counter at the Post Office, with postage and fee affixed in stamps, and “Express Delivery” boldly written at top left corner.

Single letters not exceeding 4ozs. in weight can be sent by railway. The postage and a fee of 2d. must be paid to the railway servant receiving such letter, and he will affix and obliterate a special label. Such letters must be taken to a passenger station, and will be sent to destination by first available train. They may be addressed to the Parcel Office at the station of destination “to be called for,” or, if so desired, will be posted in the nearest Post Office to the station to which addressed for delivery by ordinary post.

INLAND NEWSPAPERS.

The ordinary postal rate on newspapers is a halfpenny for every 2 ozs.; but publications which consist wholly or in part of news, or articles on current topics, and which are printed and published in the United Kingdom at intervals of not more than seven days, may—for an annual fee of 5s.—be registered for transmission by post in the United Kingdom at the newspaper rate of a halfpenny each, irrespective of weight. The full title and date of publication must be printed at the top of first page, and the date and part or all of the title on every other page. No newspaper packet may be above 5lbs. in weight, 24 in. long, 12 in. wide, or 12 in. deep. Registered newspapers must be so folded that the title may easily be read, and must be posted either without a cover, or in one open at the ends, so as to admit of easy removal for examination. Nothing of the nature of a letter may be written on the newspaper or its cover, except a reference to any part of such paper.

NEWSPAPER WRAPPERS.—Halfpenny stamp, ¾d. each, 7 for 4d. or 22s. 10d. per 480. Penny stamp, 1½d. each; 8 for 8½d., or 21s. 3d. per 240. Sheets of halfpenny wrappers may be obtained at 2 days’ notice in packets of 120 sheets of 14 wrappers each at £3 18s.

INLAND BOOK POST.

Except in regard to 2-oz. packets, which may still be sent for a half-penny, the Book-Post is practically abolished, all packets over 2 ozs. being subject to the same rates and regulations as Letters (which see).

A 2-oz. Book Packet may contain any matter wholly printed on paper, or other substance in ordinary use for printing; books or literary publications, sketches, drawings, paintings, maps, plans, etc.; invoices, advice notes, bills of lading, and similar commercial and legal documents, provided that nothing is written on them in the nature of a letter, or other entries proper to such documents; proofs or manuscripts for press, and examination papers under similar conditions, and circulars or printed notices. The circular may be altered in writing, and, in the case of notices of meeting, the place, hour, date, and objects may also be inserted. (The word "printed" is intended to cover only forms produced in numbers by ordinary mechanical means; imitation type-written circulars are included if in identical terms and in numbers of not less than 20 specially handed over the counter at a Post Office and attention called to their nature.) A Book Packet may be posted either without a cover or in one open at both ends, so as to admit of easy withdrawal for examination. The ends may be secured with string, but stamps may not be fixed partly to the wrapper, and partly on the publication.

INLAND PARCEL POST.

Parcels for conveyance within the United Kingdom can be posted at any Post Office. The limit of length allowed is 3 ft. 6 in., and the maximum of length and girth is 6 ft., i.e., a Parcel 3 ft. 6 in. long may measure 2 ft. 6 in. in girth round the thickest part. The rates of Postage, which must be prepaid, are as follows:

1 lb.	3d.	5 lbs.... ..	7d.	9 lbs.... ..	0s. 11d.
2 lbs.	4d.	6 lbs.... ..	8d.	10 lbs.... ..	1s. 0d.
3 lbs.	5d.	7 lbs.... ..	9d.	11 lbs.... ..	1s. 0d.
4 lbs.	6d.	8 lbs.... ..	10d.		

11 lbs. is the limit allowed.

ATTENTION

IS DRAWN TO THE

FRONTISPIECE

PRINTED ON THE

"Barnet"

Platino-Matt

Bromide Paper.



FOR

"BARNET"

Plates . .

P.O.P. . .

AND

Carbon Materials

See Pages 599 to 614.

Full Lists sent on application.

SOLE MANUFACTURERS:

ELLIOTT SONS, LTD., BARNET, ENGLAND.



Neg. by J. Bacon & Sons.

CONTACT PRINT ON

BARNET

PLATINO MATT BROMIDE PAPER.

*Manufacturers—Elliott & Sons, Ltd.,
Barnet, England.*



SUMMARY.

The year 1902 will long live in the recollection as marking a depth of commercial and industrial depression, lower than had been reached at any time in the previous half century, except perhaps during the Crimean War. The conclusion of hostilities in South Africa was followed by the King's illness and a postponement of his Coronation, whilst throughout the year the weather was extremely unfavourable. It is not difficult to perceive in these abnormal conditions the reason why photography, in common with many other branches of activity, suffered a serious check in its progress. The trade languished, in sympathy with that lack of popular support, which was certainly not anticipated when the predecessor of this ALMANAC was issued. Competition has been exceedingly keen, and the unpleasant effects of over-production have manifested themselves in various quarters.

But, paradoxical as that may appear, photography is a greater favourite than hitherto with the general public, the members of which, in vast numbers, have recently been attracted to the most fascinating hobby of the time by the numerous references that are now given to photographic matters in the general Press. A revival of business at the turn of the year is well within the bounds of probability, and in that event we may safely expect the ranks of amateur photographers to be very considerably swollen.

A characteristic feature of the year 1902 was the impetus given to the production of roll film photographic apparatus: inquiry into the causes of this lies outside the scope of this volume. New cameras and films have been introduced in great variety, and many of the former will be found illustrated in the text and advertisement pages of the ALMANAC. Tri-colour photography, in a simplified form, has been placed within popular reach. Self-toning papers have come into extended use. The opticians have shown considerable activity, and new lenses have emanated from the establishments of Messrs. Goerz, Messrs. Ross, Messrs. Taylor, Taylor, and Hobson, and other firms. The chemical side of photography has perhaps received less attention than formerly.

Day by day the applications of the "black art" extend and increase, and the camera has become almost indispensable to persons of refinement and education. There is at present no reason to apprehend that the firm hold on public favour which photography has secured is in danger of diminution.

OBITUARY OF THE YEAR.

AMONGST the specially prominent photographers who have died since the publication of the last ALMANAC, the following may be mentioned :

Richard Leach Maddox, M.D. (for over forty years associated with THE BRITISH JOURNAL OF PHOTOGRAPHY and ALMANAC).

M. Louis Werner.

Charles Burr.

N. A. Monnickendam.

J. V. Robinson.

Sir J. T. Chance, M.A.

Dr. Heinrich Ludwig Hugo Schroeder.

M. Louis Werner.

M. Werner died at Dublin on December 12th, 1901, in the seventy-eighth year of his age. The deceased gentleman was born in the department of the Upper Rhine, and began his art studies in Strasburg. At Paris, in 1842, he successfully competed for admission to the Ecole des Beaux Arts, where he studied under Delaroche, Horace Vernet, Ingres, and other painters. In 1854 he settled in Dublin as a portrait painter, and although he did not himself practise photography as a profession, he eventually, in 1864, founded the well-known firm of Werner and Son, photographers, a business which he conducted until the year 1885, when he transferred it to his son, Mr. Alfred Werner. The business was carried on quite privately. A frequent exhibitor at the Royal Hibernian Academy in the fifties and sixties, the late Monsieur Werner enjoyed considerable vogue in Ireland as a portrait painter. The deceased gentleman, who was much esteemed for his high personal qualities and is regretted by a large circle of acquaintances, enjoyed the friendship of J. F. Millet, Gustave Doré, and many other renowned artists of the last century.

Charles Burr.

Mr. Charles Burr, the once well-known lens-maker, passed away during the year.

N. A. Monnickendam.

Mr. N. A. Monnickendam passed away in the sixty-sixth year of his age. The deceased gentleman was known to many of our older readers as a very able producer of photographic enlargements in black and white, colour, etc.

J. V. Robinson.

Mr. J. V. Robinson was a former esteemed contributor to the JOURNAL and this ALMANAC. Mr. Robinson, who was a native of Spalding, Lincolnshire, went to Dublin over forty years ago, and was for several years engaged in pharmaceutical work, later turning his attention to photography. He, in conjunction with the late Mr. Thomas Millard, was one of the pioneers of photography in Ireland, his experience dating from the days of the old sun pictures of daguerreotype. Since that time he has been closely associated with the art of photography, and was responsible for many of the improvements which have brought this art to such perfection. His improvements in connection with photographic cameras and shutters are well known. Some years ago he constructed a camera capable of taking pictures 5ft. 6in. by 3ft. 2in., which at that time was the largest direct photograph that had been attempted. Deceased, who was widely known in scientific circles, was one of the founders of the Photographic Society of Ireland, and for many years a member of the Royal Dublin Society and other scientific bodies, taking an active part in their deliberations.

Sir J. T. Chance, M.A.

Sir James Timmins Chance, M.A., was head of the firm of Chance Brothers and Co., Birmingham, of which he had been a partner for over sixty years. He was born March 22nd, 1814, the son of William Chance, J.P., of Spring Grove, Birmingham. He was educated at University College, London, and Trinity College, Cambridge, graduating B.A., in 1838, as Seventh Wrangler. From 1859 he devoted himself especially to the manufacture and improvement of dioptric illuminating apparatus for lighthouses, and he worked with the Royal Commission of that year to correct existing errors and deficiencies therein in the lighthouses of these islands. In 1867 he was awarded the Telford Gold Medal and Premium of the Institution of Civil Engineers for his paper on "Optical Apparatus used in Lighthouses." He founded the Chance Chair of Engineering in the University of Birmingham.

Richard Leach Maddox, M.D.

At the age of eighty-five, Dr. R. L. Maddox died at Southampton, on Sunday, May 11th. His association with the JOURNAL and its ALMANAC extended over a period of forty years, and a list of his contributions on photographic and photo-micrographic subjects would be a very lengthy one. By his death we have cause to regret the snapping of an old and valuable link with the past which cannot be replaced.

We are indebted to Mrs. Gillies, Dr. Maddox's daughter, for the following particulars of his life:—"Born in 1816, for many years he lived at Constantinople, practising there as doctor, and where he married, in 1849, Amelia, a daughter of Benjamin Winn Ford, Esq., of that city, by whom he had a son, Richard Willes Maddox, artist, and a daughter, myself, the widow of Captain Andrew Gillies. My mother died in 1871, and in 1875

Dr. Maddox was married again to Agnes, a daughter of George Sharp, Esq., of Newport, Isle of Wight, who survives him, and by whom he had one son, Walter Vaughan Maddox. In 1875 my father left England for Ajaccio, where he practised among the English residents. From Corsica he and Mrs. Maddox went to Bordighera, remaining there some months. Dr. Maddox also practised near Genoa. He was also at different times resident physician to the late Duke of Montrose, the late Sir Watkins Williams Wynn, and the late Lady Katherine Bannerman. Dr. Maddox then lived for some years at Gunnersbury, and since 1886 has resided at Greenbank, Portwood, Southampton, in a most retired manner, but still interested in everything relating to science, frequently writing for journals and papers in America, France, and England. The loss to his family is beyond all words. They desire to thank the many scientific friends for their kindly sympathy, so much appreciated by them. My father's medical attendant, Dr. Wales, said it was simply 'the triumph of mind over body' that had kept him alive so long. He was interred on the 15th inst. in the Southampton Cemetery."

Commencing photography in 1853, the most notable piece of work associated with Maddox's name was undoubtedly the publication in the *British Journal of Photography*, on September 8th, 1871, of the first real attempt on record to compound a practicable gelatino-bromide emulsion. We reproduce the article in full, as it will probably interest many of the younger generation of photographers who are ignorant of the slow and laborious manner in which gelatine photography was placed within general reach:—

AN EXPERIMENT WITH GELATINO-BROMIDE.

The collodio-bromide processes have for some time held a considerable place in the pages of the *British Journal of Photography*, and obtained such a prominent chance of being eventually the process of the day in the dry way, that a few remarks upon the application of another medium may perhaps not be uninteresting to the readers of the JOURNAL, though little more can be stated than the result of somewhat careless experiments tried at first on an exceedingly dull afternoon. It is not for a moment supposed to be new, for the chances of novelty in photography are small, seeing the legion of ardent workers and the ground already trodden by its devotees, so that for outsiders little remains except to take the result of labours so industriously and largely circulated through these pages and be thankful. Gelatine, which forms the medium of so many printing processes, and which doubtless is yet to form the base of more, was tried in the place of collodion in this manner:—Thirty grains of Nelson's gelatine were washed in cold water, then left to swell for several hours, when all the water was poured off and the gelatine set in a wide-mouthed bottle, with the addition of four drachms of pure water and two small drops of *aqua regia*, and then placed in a basin of hot water for solution. Eight grains of bromide of cadmium dissolved in half a drachm of pure water were now added, and the solution stirred gently. Fifteen grains of nitrate of silver were next dissolved in half a drachm of water in a test tube, and the whole taken into the dark-room, when the latter was

added to the former slowly, stirring the mixture the whole time. This gave a fine milky emulsion, and was left for a little while to settle. A few plates of glass well cleaned were next levelled on a metal plate put over a small lamp; they were, when fully warmed, coated by the emulsion spread to the edges by a glass rod, then returned to their places and left to dry. When dry the plates had a thin, opalescent appearance, and the deposit of bromide seemed to be very evenly spread in the substance of the substratum. These plates were printed from in succession from different negatives, one of which had been taken years since on albumen with ox-gall and diluted phosphoric acid, sensitised in an acid nitrate bath, and developed with pyrogallie acid, furnishing a beautiful warm brown tint.

The exposure varied from the first plate thirty seconds to a minute and a half, as the light was very poor. No vestige of an outline appeared on removal from the printing-frame. The plates were dipped in water to wet the surface, and over them was poured a plain solution of pyrogallie acid, four grains to the ounce of water. Soon a faint but clean image was seen; which gradually intensified up to a certain point, then browned all over; hence the development in the others was stopped at an early stage, the plate washed, and the development continued with fresh pyro., with one drop of a ten-grain solution of nitrate of silver, then re-washed and cleared by a solution of hyposulphite of soda. The resulting prints were very delicate in detail, of a colour varying between a bistre and olive tint, and after washing dried with a brilliant surface. The colour of the print varied greatly, according to the exposure. From the colour and delicacy, it struck me that with care not to stain the gelatine, or use only the clearest portion, such a process might be utilised for transparencies for the lantern and the sensitive plates be readily prepared. Some plates were fumed with ammonia; these fogged under the pyro. solution. The proportions set down were only taken at random, and are certainly not as sensitive as might be procured under trials. The remaining emulsion was left shut up in a box in the dark-room, and tried on the third day after preparation; but the sensibility had, it seems, greatly diminished, though the emulsion, when rendered fluid by gently warming, appeared creamy, and the bromide thoroughly suspended. Some of this was now applied to some pieces of paper by means of a glass rod, and hung up to surface dry, then dried fully on the warmed level plate, and treated as sensitised paper. One kind of paper that evidently was largely adulterated by some earthy base dried without any brilliancy, but gave, under exposure of a negative for thirty seconds, very nicely-toned prints when developed with a weak solution of pyro., having very much the look of a neutral-toned carbon print without any glaze, and I think might be rendered useful on plain paper. Some old albumenised paper of Marion's was tried, the emulsion being poured both on the albumen side and, in other pieces, on the plain side, but the salting evidently greatly interfered, the resulting prints being dirty-looking and greyed all over. These papers fumed with ammonia turned grey under development. They printed very slowly, even in strong sunlight, and were none of them left long enough to develop into a full

print. After washing they were cleared by weak hypo. solution. It is very possible the iron developer may be employed for the glass prints, provided the actual acidification does not render the gelatine soft under development. The slowness may depend in part on the proportions of bromide and nitrate not being correctly balanced, especially as the ordinary, not the anhydrous, bromide was used, and on the quantities being too small for the proportion of gelatine. Whether the plates would be more sensitive if used when only surface dry is a question of experiment; also, whether other bromides than the one tried may not prove more advantageous in the presence of the neutral salt resulting from the decomposition, or the omission or decrease of the quantity of *aqua regia*. Very probably also the development by gallic acid and acetate of lead developer may furnish better results than the plain pyro. As there will be no chance of my being able to continue these experiments, they are placed in their crude state before the readers of the "Journal," and may eventually receive correction and improvement under abler hands. So far as can be judged, the process seems quite worth more carefully-conducted experiments, and, if found advantageous, adds another handle to the photographer's wheel.

Eight years later, when tracing the rise and progress of gelatine emulsion photography, the late W. B. Bolton no mean authority, wrote of Maddox's experiments in the following terms* :—

"This formula differs in but one or two respects from the average formula given at the present time (1879). In the first place, *aqua regia* is used, which must have an injurious action upon the gelatine; and, in the second place, an excess of silver exists in the finished emulsion. What that excess may be it is impossible to say without more definite information as to the quantity and strength of *aqua regia* employed. But let us turn to the working of this 'pioneer' gelatine emulsion as described by Dr. Maddox himself. The plates were exposed under negatives, the exposures extending from half-a-minute to a minute and a half in a very poor light. The development was conducted with a plain four-grain solution of pyro., and after a thin clear image appeared, it was intensified with pyro. and silver. Some plates fumed with ammonia fogged instantly on the application of the developer. The emulsion, three days after preparation, was found to have greatly diminished in sensitiveness. It must be borne in mind that no instructions are given for removing the superfluous salts from the emulsion after sensitising, and that, therefore, in addition to the nitrate of sodium formed by double decomposition, the mixture contained free silver and free nitric acid. The presence of these two latter would sufficiently account for the development proceeding under the action of plain pyro. solution, the operation consisting, in fact, of silver development, and would further explain the slowness of the plates which Dr. Maddox complained of in the course of his article. Moreover, it is not surprising that after fuming with ammonia (which would neutralise the restraining acid)

* "B. J. Almanac," 1880, page 24.

the plates should fog on the application of pyro., for in the absence of any restrainer the free silver contained in the film would be instantly reduced. Such was the first attempt to utilise gelatine as a vehicle in which to suspend the sensitive silver salts in place of collodion; and though it proved the possibility of thus utilising gelatine, the experiment cannot be said to have turned out a success. It is not difficult at this date to point out where Dr. Maddox failed; the emulsion itself was not so much in fault as the outside circumstances under which it was to be worked."

Maddox's experiments received, in a marked degree, the stamp of public acknowledgment, although it must be confessed the recognition was in many cases somewhat tardy. The gold medal of the Inventions Exhibition held in 1885 was awarded to him; and other distinctions were the John Scott bronze medal from Philadelphia; a bronze medal from Brussels; a gold medal from Antwerp, and numerous diplomas. The Progress Medal of the Royal Photographic Society was conferred upon Maddox on February 12th, 1901, the present Editor of the "British Journal of Photography" having the honour of being deputed to receive the medal on behalf of the distinguished experimentalist. In the autumn of 1891 the "British Journal of Photography" also took the initiative in raising a sum of between £500 and £600, contributed by photographers in England, France, Germany, and America, in recognition of the value of his work.

In microscopy and photo-micrography, Maddox also did distinguished work, and the latter subject gave him a theme for an excellent series of articles in the volume of the "British Journal of Photography" for 1883. In the following year his portrait and biography were also published in its pages, and the following extract from the appreciation of him then given will show the esteem with which his microscopic work had long been held:—

"Dr. R. L. Maddox, after a voyage round the world in 1839-40, in search of health, spent many years abroad practising in an official and private capacity, but had eventually to renounce the arduous duties of his profession from constant suffering of a very painful nature, which had extended over half-a-century. He had early taken up the subject of microscopy as connected with his profession, and had translated Dr. Dujardin's manual at the time that Quekett's 'Treatise on the Microscope' appeared. Owing to the impossibility of arranging for the use of the beautiful plates of Dujardin's work, the translation was never published. Being obliged to return to England, Dr. Maddox employed himself in trying to extend the labours of others by combining photography with microscopic research, and in this path was so far successful as to be the recipient of two medals, and for his various writings on this and microscopical subjects he was elected an Honorary Fellow of the Royal Microscopical Society. About the time of his introduction of the gelatino-bromide process Dr. Maddox was carrying on a series of examinations on the living organisms found in the atmosphere, and which necessitated prolonged and tedious work with

the microscope, amounting sometimes to sixteen hours in the day. In his method he differed entirely from those who had preceded him, and this has been made the basis of further and most extended researches by others, especially by Dr. Douglas Cunningham and his friend, Dr. Miquel, of the Observatory of Montsouris, Paris. Dr. Maddox used an apparatus of his own invention—the “aéroconiscope”—a kind of multiple funnel set up as a vane. The wind traversing this instrument deposited the organisms on a thin cover-glass duly prepared for the purpose. The organisms were then cultivated, and many of them carefully figured, the results being published in the current *Monthly Microscopical Journal*.

Of the gelatino-bromide process we need scarcely say more than that its present high state of utility has been brought about by the labours of the many, and Dr. Maddox may justly be proud that he closed his paper on the process with the hope that he had given another handle to the photographers' wheel, which has indeed, without restriction, been turned to their common benefit. He gave much of his time to microscopic drawing, as is attested in the work of the late Dr. Parkes on “Hygiene,” and Dr. Naylor on “Skin Diseases,” and other authors; but his coloured drawings of many of the diatomaceæ under reagents, and his figures of the ferments in the deposits of beer, etc., have, we believe, never been published. Worn down by much suffering, he was again obliged to reside abroad for a considerable period, and renounce his favourite pursuits; but since his return he has devoted much of his time to them, especially in the endeavour to photograph the bacteria—some of the minutest living entities, which require both skill and patience for reproduction by photography. Dr. Maddox was always ready to impart any information he might possess, holding that the claims of science, for her advancement, were—“If freely ye have received, freely give.”

In a letter to Mr. W. J. Harrison, published in these columns on November 4th, 1887, Dr. Maddox explains why in emulsion work his attention was directed to gelatine and silver bromide:—

“Firstly, the cost of the collodion, with the troublesome manufacture of the cotton; secondly, health more or less affected by its constant use when working, as I was, in my camera, a dressing-room, often at a very high temperature in the summer months; and, thirdly, dissatisfaction with the dry methods for the photo-micrographic work upon which I was much engaged. The first reason may be dismissed as of little moment when there was an adequate return upon the work done, but not so when there was an absolute loss even in an amateur's point of view. The second reason was a more important one. Being often shut up for hours in the said camera, the temperature at full summer heat, I found the system completely saturated with the vapour of the collodion, so much so, that it could be tasted in the breath on awaking in the night, and sleep was generally much disturbed and unrefreshing, while it was much needed to restore the nervous energy wasted by constant suffering, often very severe in character; moreover, there was an outcry in the household that the collodion vapour unpleasantly pervaded every room in the house. The

third reason was that I could find no satisfactory dry or sticky process that did not embrace the first two reasons, and add another of its own in the shape of additional time and trouble in the preparation of the plate. These reasons set me experimenting, sometimes on paper, sometimes on glass, with vegetable gummy matters, as lichen, linseed, quince-seed; and with starchy substances, as rice, tapioca, sago, etc.; and with waxy material, as Japanese vegetable wax. Often I fancied I was just within the doorway when the door closed, and other plans had to be tried. All the literature I could find bordering on the subject was searched, but it rather bewildered than enlightened. At last I turned to the animal series, and wasted many eggs and some little silver; then I went to the finest isinglass, at about twenty shillings the pound weight, and the very first experiment led me to hope I was on the right track, only something had to be altered, as I was using iodo-bromide in varying collodion proportions, and the isinglass did not appear to yield a sufficiently even surface, in spite of all kinds of filtering; yet confidence was felt that a vein had been struck. Search was now made in the house for a packet of Nelson's gelatine; this afforded a better surface, especially as the plates were dried generally on a hot one-inch thick iron slab, and tested at once. Then came the mixture of isinglass and gelatine, but the advantages pointed to gelatine. The little plates were tried under a negative, then on out-of-door objects, but it was impossible to get some laurels depicted in anything more than black and white. I remembered that someone had stated that the bromides were better suited than the iodides for foliage; now came the experiment of diminishing the iodide and increasing the bromide, until it settled into bromide alone. Yet I was not satisfied, but experimenting went on so rapidly that often I did not wait to filter the gelatine before mixing the bromide of silver in it. Before this period, that talented experimenter, Mr. Carey Lea, had spoken of the use of *aqua regia*, and my attention was turned to it, fancying that its use would decompose some of the gelatine and furnish the extra silver a chance of forming an organic salt of silver, which might possibly improve the image. After working with this, and getting more satisfactory results, various substances were mixed with the gelatine, as gum, sugar, glycerine, etc., which gave different tints to the developed negatives, and it was seen that it only required farther experimenting to put gelatine into use; for some of the negatives were fairly plucky and half-tones beautifully rendered, but, compared with collodion, the gelatine was slower, although it stood its ground with some of the dry processes. Paper had not been neglected, for amongst the paper trials with the gelatine was one which I thought gave much promise, the tint on development equal to much of the kind of the present day. This was obtained by the addition of a small quantity of arsenite of silver. There was no thought of bringing the subject into notice until it had been lifted from the cradle. Soaking plates before use—for, of course, I knew the useless salts were left in the gelatine—was noted down for trial; but at this stage, and while in the very heyday of experimenting, there came an urgent appeal from my kind friend, Mr. J. Traill Taylor, to assist him without delay by an article for the BRITISH JOURNAL OF PHOTOGRAPHY, of

which he was the editor, as he had been taken seriously ill. Without a moment's hesitation, and thinking it would give my friend pleasure, the hurriedly written and fragmentary article that appeared in the September JOURNAL of 1871 was forwarded to him, the proofs of sundry negatives were also sent, some of which, almost entirely defaced, my friend Mr. W. B. Bolton and I found three or four years since amongst the glass in the office at No. 2, York Street. Another pen had also come to the rescue, and my paper was deferred to the following weekly issue, when Mr. Taylor, with far-sighted judgment, noted the process had a future before it. Health had now fairly broken down, rest was needed, so that very little farther experimenting was done, and as there were other irons in the fire demanding attention, the process was offered to a firm in Southampton from whom I used to get my albumenised paper; but it was found there was no time to continue the necessary experiments to raise the rapidity and enhance its value. This was done at different stages by others, almost two years after I had freely given to the public what had cost me much time and labour."

If Maddox's experiment in emulsifying silver in gelatine does not entitle him to the credit, somewhat erroneously attributed to him, of having "invented" the gelatine dry plate, there is no doubt that it pointed the way for others in the work. It must not be forgotten that Harrison and Gaudin perceived the possibilities of gelatine for the purpose; and that the real difficulties of the process were encountered and overcome by those who followed after Maddox, whose ideas, as Bolton points out, were not altogether completely practicable. All the same, there stands the initial formula, which produced silver images in gelatine, and the historian is therefore justified in assigning to Maddox the distinction of making a new departure in experimental procedure. A pleasant trait of the deceased gentleman's character was his readiness to help, to the fullest of his capabilities, those who sought his advice and help in photographic and photo-micrographic work.

Dr. Heinrich Ludwig Hugo Schroeder.

Dr. Schroeder, who died on October 31st, served his apprenticeship as a mechanic and optician with Moritz Meyerstein, instrument maker to the University of Gottingen. His study of optics was continued under J. B. Listing, of the same city, when he had completed his apprenticeship, and subsequently we find him in Hamburg as a maker of telescopes. In the latter part of the seventies he removed to Oberursel, near Frankfort-sur-Maine, but this change did not add to his business, and he relinquished it in 1882, to accept an invitation from the firm of Ross and Co., to take charge of the scientific work connected with their establishment. His knowledge of the optics of the telescope and microscope eminently qualified him for the position. It will be remembered that a few years after his arrival in this country, the discoveries of Dr. Schott, who was working in conjunction with Professor Abbe, revolutionised the manufacture of optical glass, and gave an enormous extension to the field

for the optician's skill. Dr. Schroeder was one of the first to make use of the new possibilities, and led the van in photographic optics by inventing the concentric lens, the first photographic objective constructed with an abnormal pair of glasses. The lens is remarkable for its simplicity of construction, being symmetrical, with both halves, formed of a plano-convex cemented to a plano-concave element, possessing concentric surfaces. In adopting this construction, it was necessary to disregard the aberration of sphericity, and correct it by means of a diaphragm. The lens was consequently slow, and it was soon superseded by the more complex, but much more rapid objectives, invented by Continental opticians. It should, however, be remembered that the patent of this lens was applied for in 1838, and that its commercial introduction was delayed for some years by difficulty in obtaining the requisite glass. We may say, in recognition of the inventor's skill, that attempts were made by at least one other optician to construct a lens on similar lines, but without success. For the information of those unacquainted with the performance of the lens, it may be described as having a very flat anastigmatic field, and in this respect shows a great improvement, in comparison with the portable symmetrical type.

In the year 1891 a controversy arose between Mr. T. R. Dallmeyer and Dr. A. Miethe, as to priority in constructing a telephoto system of lenses. Like many other supposed inventions in photography, it was found to be ante-dated, and both disputants were denied the distinction. In a letter to the "British Journal of Photography," published on the 29th January, 1892, Dr. Schroeder pointed out that in 1869 to 1870 he was engaged upon the construction of a telescope for Baron von Bulow, and converted it to a telephoto system by using either a negative or a positive enlarging lens, according to the instructions given in the works of Sir John Herschel, Peter Barlow, and others. Photographs were taken with the instrument by Herr Hoge, a Hamburg photographer. The late editor of "The British Journal of Photography," Mr. J. Traill Taylor, appended a footnote congratulating Dr. Schroeder upon the completeness of his researches, and stated that in the race for priority Dr. Schroeder must be held as coming in an easy first. It has, however, since been shown by Dr. von Rohr that Porro ante-dated Dr. Schroeder, having constructed a telephoto lens, with which he photographed an eclipse of the sun on the 28th July, 1851. Dr. Schroeder made use of the principle subsequently in a patent for a terrestrial telescope. The enlarging lens formed one of the components of the erector, and by a mechanical contrivance the eye-piece and the magnifying lens were so connected that the two could be simultaneously adjusted. In 1894 we find Dr. Schroeder's name associated with a patent for another photographic lens. This was an unsymmetrical doublet, in which the spherical aberration was corrected by one component and the chromatic aberration by the other. In the former the relative dispersions of the two glasses were as nearly as possible equal, whilst the difference of refraction was as great as possible. The converse was the case in the other component. Another photographic lens was also outlined by Dr. Schroeder, whilst

engaged by the firm of Ross and Co. Dr. von Rohr describes it as a lens for astro-photography, resembling Sutton's triplet. The outer lenses were collective menisci, and the spherical and chromatic aberrations of the axial and oblique pencils were to be corrected by a middle compound lens. The construction does not appear to have been completed.

In 1894 Dr. Schroeder migrated to the United States, and entered the service of the Manhattan Optical Companies. Whilst there he invented and patented a photographic lens of very simple construction. The front lens was a combination of flint and crown, whilst the back lens was of flint only. Modern glass was used in its construction. In this lens we see Mr. Aldis's idea embodied, of constructing a doublet formed of only three elements. Considering the simplicity of the lens, very good results were obtained.

Dr. Schroeder returned to England in 1895, and since then has lived in retirement. Frequent articles from his pen have, however, appeared in the German press. Even as late as February, 1901, we find a patent taken out in his name for an improvement in photographic lenses. Whilst the former patents were marked by simplicity of construction, this last effort is of an opposite character. Two constructions are described and illustrated in the specification. Both have four elements in each component, and both objectives are unsymmetrical. Details of the indices, curves, and thicknesses are not given.

Dr. Schroeder's work on photographic optics, entitled, "Die Elemente der Photographischen Optik," was published in 1891, and forms one of the volumes of Dr. Vogel's "Handbook of Photography." The strength and originality of Dr. Schroeder's mind is visible throughout its pages.

[CHAPTERS ON PHOTO-MICROGRAPHY.]

INTRODUCTORY.

THE present chapters upon photo-micrography are written in compliance with the oft-repeated request of many readers of this ALMANAC.

As far as circumstances and space will permit, a comprehensive and detailed account of the scope, and methods employed in modern photo-micrography will be given, and it is hoped that the plan adopted in the treatment of the subject will not only prove of service to those already employing this means of recording their investigations in different branches of natural science, but will aid those readers who are desirous of adapting photography to their microscopical studies, and at the same time attract others to take up this most fascinating and important branch of photography and thereby promote its more universal adoption for the efficient delineation of microscopic objects.

Photo-micrography has long held a certain position in photography, and very early in the history of this art was utilised by the employment of the solar microscope, or by artificial illumination with the lime-light, as in the time of the daguerreotype, when Messrs. Doune and Foucault adapted it for the illustrations of the atlas issued with Dr. Doune's work, *On the Use of the Microscope*, published in 1845. These chemically-etched daguerreotype plates yielded very beautiful prints.

The papers that have from time to time appeared from the pioneers of photo-micrography and their followers, are scattered far and wide in almost countless transactions and proceedings of learned societies, magazines, books, periodicals, and photographic almanacs, making it very difficult to trace correctly the rise and progress of this branch of photography from the earliest to the most recent date. In England, the names which stand out as being intimately connected with the practice and development of photo-micrography are:—Fox Talbot, Danar, Hodgson, Reade, Kingsley, Diamond, Scott Archer, Shadbolt, Delves, Highley, Wenham, Busk, Herapath, Howlet, Bocket, Durham, Pollock, Legg, Wace, Davis, Parry, Hislop, Beck, Heisch, Higgins, Hughes, Wilson, Abercrombie, Norris, Taylor, Viles, Fowke, Maddox, Jennings, Beale, Davis, Carpenter, Cutter, Charters White, Wynne E. Baxter, Boursfield, Dallinger, Pringle, Hogg, Duncan, Spitta, &c., &c.

In France, photography was applied to microscopical research at a very early date, and in connection with the subject stand the names of Duchesne, Boulogne, Rouget, Moitessier, Jules Girard, Nachet, Bertsch, Nezt, Lattubauer, Donnadiou, Lilleforme, Guinard, Brebisson, Henri van Heurck, &c., &c.

In Germany, Reichardt, Strüenberg, Meyer, Albert, Hesseling, Kallmann, Gerlach, Melwij, Koch, and many other able workers have given the world records of their labours.

■ In America the employment of photo-micrography as a means of obtaining an accurate record of microscopical research, met from the very first with liberal support from the Government and from wealthy private individuals; and amongst the many able American workers may be mentioned the names of Curtis, Woodward, Dean, Draper, Rood, Carl Seiler, Mercer, Steenberg, Towler, Price, and Hitchcock.

■ It is a curious fact, that although photography has been applied to microscopical research ever since the days of the daguerreotype, uncertainty as to the correct name to apply to this branch still exists in the minds of many. The question was really settled once and for all, away back in the early days of collodion, by Mr. George Shadbolt, who proposed that the term *microphotograph* should always be applied to a very small photograph of a large object, and the term *photo-micrograph* should be the name used for the enlarged photographic representation of a microscopic object by the aid of microscope objectives.

Thanks to the high state of perfection to which the modern microscope and its objectives have been brought, and to the vastly improved methods of staining and preparing specimens, photo-micrography has made wonderful progress during the last fifteen years, and is steadily growing in favour amongst scientific men, not only as a rapid means of obtaining an accurate record of their microscopical researches, but also for illustrating text-books on natural science subjects. There are, however, still a few people who consider the application of photography to the microscope as of little real service or advantage, but in nine cases out of ten their prejudice is the result of ignorance of the possibilities obtainable by modern methods, or from attempting to obtain photographic reproductions of more or less impossible subjects; that is to say, they have attempted to obtain in a single negative all that their eye and brain has learnt by a mental combination of a series of images presented to the eye by the examination of the object at different planes of focus. To attempt to delineate photographically an object, the details of which extend through a series of planes, is to court certain and unqualified failure. The most that can be done with such a subject is to select the best general appearance, but the interference by the planes above and below the selected focus will largely destroy the definition, and the result will be a heavy and unintelligible picture. Such a subject is at present only to be intelligently and clearly depicted by the skilled draughtsman, who, by selecting the point at which greatest harmony is secured, or by giving greatest prominence to the details of those parts of chief interest, and at the same time suppressing all minor and unimportant parts, has the power to present a picture which is far more easily appreciated by one who has never seen the object through the microscope than can be obtained by a single photograph. Such subjects, however, by no means predominate in microscopical research, and therefore it is extremely unfair and narrow-minded to ridicule photo-micrography as an important adjunct to research, because of its inability to at present cope with one class of specimen. Indeed, many of these objects, histological and pathological subjects, which formerly were a stumbling-block, can to-day be accurately and successfully photographed, so exquisitely thin are the sections obtainable with the modern high-class microtome.

Photo-micrography to-day embraces a very wide and varied field of work. Low-power photo-micrography is employed for obtaining photographic representations of subjects requiring a magnification ranging between two and sixteen diameters, and for such work a microscope need not necessarily be employed, the objective being attached directly to the front of the camera. Medium-power photo-micrography embraces subjects requiring a magnification starting from sixteen or eighteen diameters up to about 500 or 550 diameters, and for this work, of course, a microscope is required. High-power or critical photo-micrography extends from 500 diameters onwards to about 1,500 diameters, and to be successfully practised requires the most accurate and perfect apparatus, in conjunction with considerable knowledge, skill, and experience. The various three-colour processes have made it possible to obtain fairly perfect colour photo-micrography of stained specimens and polariscopic subjects. By means of a comparatively simple piece of apparatus perfect stereoscopic photo-micrographs can be easily obtained. Details of apparatus, and methods of manipulation for all the above-mentioned branches of photo-micrography will be found in the following chapters, and, as an appendix, a bibliography has been compiled. |

II.—ILLUMINANTS.

ONE of the greatest attractions and advantages of photo-micrography is that it can be practised at any season of the year and at any hour of the day or night ; there being no need to depend on daylight for results.

Of sources of illumination the photo-micrographer has at his disposal sunlight, electricity, limelight, acetylene gas, incandescent gas, and mineral oil. Owing to the rotation of the earth a special piece of apparatus, called a heliostat, is required to keep the sun's image in position in the field of view long enough for a photograph to be successfully taken by sunlight. The heliostat is rather a costly piece of apparatus, and must, of course, be made for the latitude of the place where it is going to be used. There are a few microscopic objects for which sunlight as the source of illumination is almost a necessity if the finest results are desired. But with patience and care, even these subjects may be successfully photographed by artificial light. However, Messrs. Watson and Son, of Holborn, supply a very excellent form of heliostat, by the aid of which most beautiful results may be obtained.

Although, theoretically, the arc electric lamp is an ideal illuminant from the fact that a point of light is continually existent, in practice it labours under one grave disadvantage, which has caused many photo-micrographers to abandon its use. This practical difficulty arises from the fact that although a point of light is continually existent, it is constantly changing its position, thus upsetting the centring of the light with the optical axis of the microscope, and producing uneven illumination of the field of vision. Messrs. Ross and Co., however, have lately placed on the market an improved form of lamp, in which there is much greater steadiness of the arc light. Messrs. Watson and Sons have

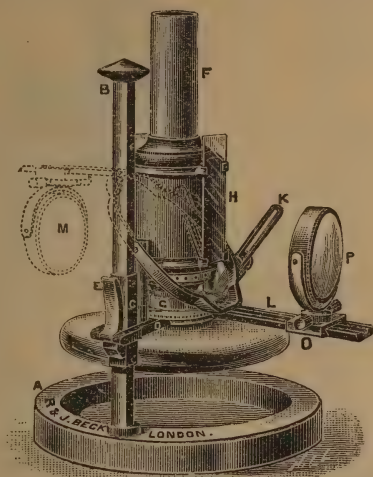
just brought out a very useful electric lamp ; it consists of a brass standard on a weighted base, carrying a 16-candle power incandescent lamp, with frosted glass bulb on a movable double arm, adjustable in all directions. The lamp-bulb is enclosed in a bright nickelled reflector of parabolic shape, thus entirely shielding the eyes from the direct glare, and at the same time concentrating the light upon the mirror or sub-stage condenser of the microscope.



Watson's Electric Lamp.

Lime-light is a very popular form of illuminant, and is a very useful, all-round light. It is employed in two forms, one called the mixed-gas jet, where the oxygen and coal gas (or hydrogen) mix in the jet itself, just before ignition ; and the other called the blow-through jet, in which oxygen gas, under pressure, blows through and into a stream of ordinary house gas issuing from an independent source. Various forms of mixed-gas jets are on the market, from amongst which may be

singled out as particularly suitable for photo-micrographic work, Beard's high-power "mixed" jet, which besides the usual arrangement for turning the lime, has in addition a handle for turning both gases down when the light is not immediately wanted. This "cut-off" arrangement means a great saving in gas, as the oxygen is completely stopped, and only sufficient coal gas allowed to pass to keep the lime warm. Other high class and useful mixed jets are made by Messrs. Ross and Co. and Messrs. Newton and Co. A mixed jet of great power, which has gained very rapidly in general favour, is the Gwyer jet, made by Messrs. Willways and Sons. Some little skill and knowledge is required in manipulating the mixed jet, and, therefore, no novice should attempt it until he has had two or three lessons and demonstrations from an experienced worker. Let him always remember that the gases are stored under a

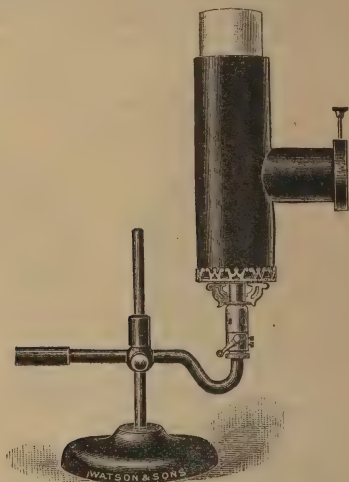


Beck's Oil Lamp (with Condenser).

very great compression, and that unless he is absolutely sure of what he is doing with the various taps he is courting the possibility of a disastrous explosion. For this reason, the "blow-through" jet is much the safest for the beginner. It consists of two tubes for the oxygen and coal gas, the supply of coal gas being obtained generally from an ordinary burner in the room, by means of indiarubber tubing attached to burner and jet. The supply of oxygen must, of course, be under pressure, and stored in a proper steel cylinder, as supplied by Brin's Oxygen Co., of Horseferry Road, Westminster.

Acetylene gas is used much more on the Continent than in England, but thanks to steady improvement in the apparatus required for generating the gas, and the better quality of the calcium carbide, this beautiful

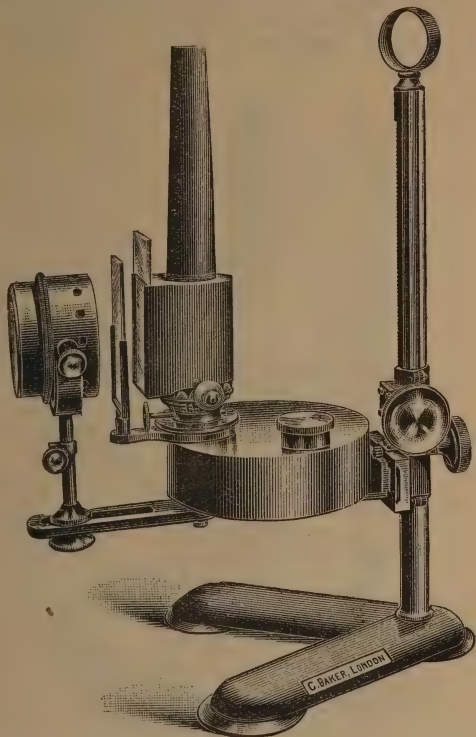
and cheap form of illumination is at last coming more to the front. For photo-micrography acetylene is an excellent illuminant, in many ways preferable to limelight, and those who once adopt it rarely discard it for some other form of light. It is intensely brilliant and yet comparatively cool. Formerly the chief trouble was in generating the gas, obtaining a fairly pure form, and storing it with safety. But these troubles, so far as the photo-micrographer is concerned, are practically at an end. An excellent small and portable generator, which is perfectly safe, simple to manipulate, and inexpensive, has been designed and placed on the market by Mr. W. Tyler, and is called the "Dreadnought" acetylene gas generator.



Watson's Incandescent Gas Lamp (with Iris Diaphragm).

The incandescent gas mantle and burner require no description, being familiar to everybody. Though the light is very brilliant, the incandescent gas has one grave disadvantage when "critical light" has to be used, for on focussing the mantle its uneven appearance will, of course, be added to the picture. It is possible to more or less prevent the image of the mantle appearing in the picture by, after focussing the light, placing a sheet of thin ground-glass between the mantle and the condenser; but if this is done, the photograph can hardly be said to have been taken by "critical light." Another method of eliminating the structure of the mantle from the field, and one which is most successful, has been devised by Messrs. Watson and Son in their new incandescent gas lamp. The burner and mantle are covered by a metal hood to which is fitted an iris diaphragm, and by treating the aperture of the iris diaphragm as the source of light, critical light will be obtained without the presence of the disfiguring mantle appearing.

█ The chief objection to oil as an illuminant is that its use necessitates very prolonged exposures with magnifications exceeding 300 diameters. However, it is by no means to be despised, for some of the finest photo-micrographs ever produced have been obtained by means of its light. Only the very best paraffin oil obtainable should be employed, the wick should be carefully trimmed, and a penny lump of camphor placed in the reservoir. A flat-wicked lamp should always be used. There are



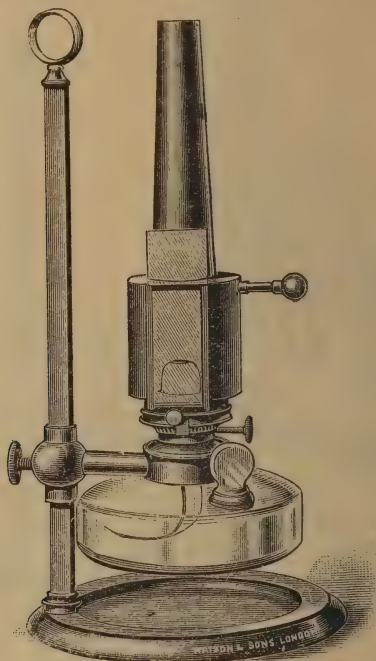
Baker's Special Lamp for Photo-micrography, with vertical and horizontal movements by Rack and Pinion.

several lamps on the market specially designed for photo-micrographic work, those sold by Messrs. R. and J. Beck, of Cornhill; Messrs. Baker, and Messrs. Watson and Son, being admirably suitable for all purposes; each having a special form of condenser attached. With these lamps and a good oil, the exposure is by no means inordinately long, even with a magnification of upwards of 1,000 diameters.

III.

LOW-POWER PHOTO-MICROGRAPHY.

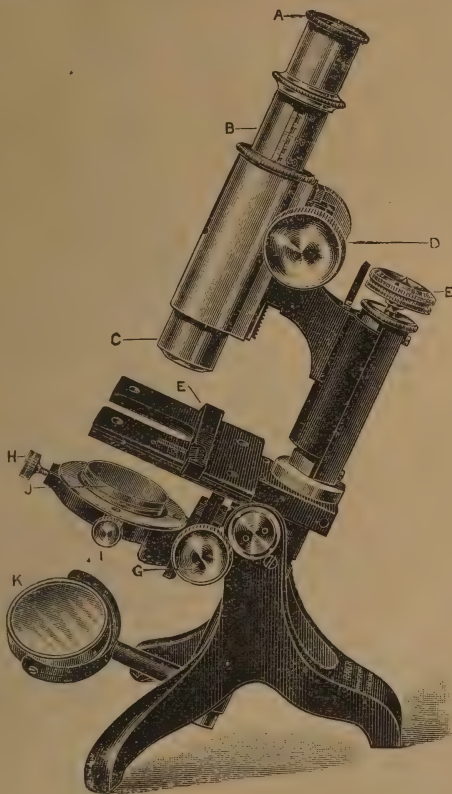
For low-power photo-micrography a microscope is not required; in fact, it would be very much in the way. This sounds a little startling at first, but when we consider that in low-power photo-micrography the magnification ranges from one to ten or twelve diameters, and that, therefore, the objects to be photographed will be of a comparatively large size, the reason for dispensing with the aid of a microscope becomes obvious.



Watson's "Standard" Lamp.

For this low-power work it is most important that the camera should have a considerable extension of bellows. To begin with, at any rate, a quarter-plate camera is preferable to a half-plate, on both economical and practical grounds; for, in the first place, the expense incurred will be only half as great, which is a consideration with most people, and a quarter-plate negative is much more easily manipulated during deve

lopment than a half-plate one. Moreover, a good quarter-plate negative will always bear considerable enlargement. An ordinary quarter-plate stand camera will do admirably for photo-micrography, provided it has, when racked out to its greatest length, a bellows extension of 12 or 14 inches at least.



Baker's "Advanced Student's" Microscope.

A stand must be made to carry the camera and object to be photographed. For this purpose a well-seasoned pine or deal board, 4 feet long, 9 or 10 inches broad, and $\frac{3}{4}$ inch to 1 inch thick, which has been planed true on both sides, must be procured from the timber merchant. With great care draw an accurately central and straight line down the entire length of the board. It is most important that this line should be

absolutely central and straight, as it will greatly facilitate and simplify matters later on. At one end of this board a stage must be built, to which the camera can be firmly fastened by means of a tripod screw. The camera stage, which must be absolutely true and level, should be screwed on to two solid blocks, about 4 inches high, $1\frac{1}{2}$ inch broad, and 7 inches long, fastened to the baseboard with screws. From the base of the supporting blocks two V-shaped rails should run the whole length of the board, and upon these the object-holder will travel. A carpenter will make these for a small sum.

Take a piece of one-inch board, 10 inches long and 4 inches broad, and to the under side fasten two pieces of wood with grooves corresponding in angle to the rails on the baseboard. Next make a good frame of half-inch wood, say 10 by 15 inches, and 2 inches deep. Screw two fillets of one-inch wood on to the top of the board carrying the grooved supports, leaving a space of 2 inches for the frame to slide into. By this means a cross movement can be obtained, which will be very useful for comparatively large objects. Narrow fillets of wood screwed on the inside of the frame will produce a rising and falling adjustment with the aid of a thumb-screw, which will fix the carrier in any position required. A set of carriers should be made, fitting one within the other, the largest just fitting into the frame, and the smallest, which must have its centre exactly true with the centre of the camera lens, should have a round central hole about $1\frac{1}{2}$ inch diameter. A duplicate inner board without a central hole will be useful.

A little below, and to right and left of the central hole in the smallest carrier, two clips similar to those used on the microscope stage for holding the glass slide on which the object is mounted must be inserted. They can be made out of two stout pieces of steel spring, mounted on a brass or steel pin.

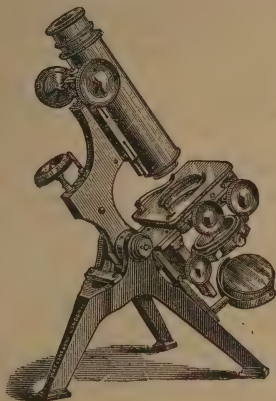
The stand completed, the next thing to consider is what lens or lenses will be required. For photographing a comparatively large object, such as a spider or a Chalk-hill Blue butterfly, subjects which only require a magnification of two to four diameters, the best lens to use is some form of what is technically termed a short-focus lens—a portrait lens of about 3 inches focus is very useful for such work. A very excellent small rectilinear lens of about $1\frac{3}{4}$ inch focus, with which beautiful results up to a magnification of seven or eight diameters may be obtained, is made by Messrs. Dallmeyer specially for low-power work. The Zeiss and Ross-Zeiss "Planars" are beautiful lenses for low-power work, but very costly. The Beck-Steinheil Orthostigmats are also to be highly recommended.

The ordinary microscope objective is out of the question when the magnification required does not exceed ten diameters, for, be it remembered, these objectives are only intended to be used with the microscope, and are, therefore, only corrected for a small field of view. Consequently, should a microscopical objective be fastened to the camera with a view to taking a photograph of a small moth, magnified nine or ten diameters, only the exact centre of the field will be found to be sharply in focus and clearly defined, while the portions surrounding the centre, and extending to the edges of the picture, will be "fuzzy."

When, however, the object to be photographed requires a higher

magnification, and therefore a more circumscribed field of view, a good 3 or 2 inch microscope objective will be most useful. These lenses are by no means expensive, and a good one can be frequently obtained second-hand at a very moderate price.

Whether the object of which a low-power photo-micrograph is required is to be photographed by reflected or transmitted light depends entirely upon the nature of the specimen. It will be as well here to briefly state the microscopical meaning of reflected and transmitted light:—An object is said to be viewed by transmitted light when the light is made to pass from the source of illumination directly through the object, thus bringing the internal structure into view. For this purpose the object must be transparent or semi-transparent. An object is viewed by reflected light when the light is allowed to fall upon it, and not pass through it; by reflected light only the peculiarities of the surface of the object are seen. To photograph a Chalk-hill Blue butterfly by



Watson's "Edinburgh Student's" Microscope:

reflected light, with a magnification of two diameters, and using daylight as the source of illumination, the photo-micrographic stand is placed near a window with a north aspect. The duplicate inner carrier without the central hole is substituted for the one with the central opening, and the butterfly is pinned upon it in position. Care must be taken that the apparatus has been placed in such a position near the window as to ensure the object receiving an even illumination. It is advisable also that the background on which the butterfly is pinned should be grey or dead black. When everything is arranged, focus the object upon the ground-glass screen to make sure that it is in the proper position. Then substitute a piece of plate-glass, with a few scratches upon its surface, for the ground glass, and upon this plate-glass screen do the final focussing with the aid of a focussing glass. It is only by this means that a really critically sharp image can be obtained.

Supposing the object to be photographed is transparent, or mounted in Canada balsam upon a glass slip for microscopical examination, the camera-stand must be placed so that the object-holder end is close to the window, and in such a position that the light from the sky is unobstructed, and able to pass through the central hole in the inner carrier in such a manner as to give an evenly-illuminated field. This in most cases will be facilitated by slightly tilting the camera-stand.

Now, all objects that lend themselves to illumination by transmitted light may with advantage be photographed by artificial light, *i.e.*, either oil or incandescent gas. The additional apparatus required is at once simple and inexpensive; all that is wanted being a condenser (preferably 6 inches in diameter), and either a good circular-wick paraffin lamp or an incandescent gas outfit, such as is supplied for use with the lantern. A box must be constructed, and for safety's sake, lined with thin sheets of tin. This box should be large and roomy, and well ventilated, so that it may not get too hot and so endanger the condenser cracking. Provided several air-holes are punched along the bottom of the sides of the box, and the chimney is a wide one, there should be little fear of this.

A sheet of fine ground glass placed between the light and condenser will be found not only to greatly improve the illumination by more evenly diffusing the light, but to cut off much of the heat that would otherwise fall directly upon the back lens of the condenser and prove a source of danger. Care must be taken that the position of the condenser is central with that of the lens attached to the camera, or it will be impossible to obtain a properly illuminated photograph.

It is almost impossible to give any hard-and-fast rule as to the length of exposure, as so much depends upon the power of the illuminant, the thickness of the object, and the speed of the plate used. A fairly transparent object, such as an ant, or small caterpillar, mounted in balsam, would probably be found to require from ten to fifteen seconds' exposure with a good incandescent mantle.

The plate must be backed, or halation will be inevitable; and some form of isochromatic plate should be used, so that as nearly true a rendering of the colour-value as possible may be obtained.

There are now several excellent brands of isochromatic plates on the market from which to select. Those made by Messrs. B. J. Edwards are wonderfully free from "grain," which is of the greatest importance to the photo-micrographer; these plates are easy to work with most developers, and are sent out ready backed at the same price as the unbacked plates. Messrs. Lumiere also supply a beautiful series of isochromatic plates, colour-sensitised for the red, green, and blue.

In developing a photo-micrographic negative the development must be carried very much farther than is usual with a landscape or architectural subject. Not until the image is fairly visible on the back of the negative must development be discontinued and the plate transferred to the "hypo" dish, or it will be found to lack sufficient density. In fact, unless he is careful to bear this in mind, the tyro will find that he will have more failures from under than over-development.

Pyro-soda and glycin will be found two of the most useful developers the photo-micrographer can select for all branches of his work. The

following modification of Edwards' pyro-soda formula has stood the test of many years of photo-micrographic work, and never disappointed the user:—

Sol. A.

Pyrogallic acid	..	..	..	..	..	1 oz.
Metabisulphite of soda	..	..	..	..	..	1 oz.
Water	..	..	..	..	..	20 oz.

First dissolve the metabisulphite and then add the pyro.

Sol. B.

Carbonate of soda	..	..	..	..	12 oz.
Sulphite of soda	..	..	..	..	4 oz.
Water	..	..	..	..	40 oz.

To use, take 2 dr. Sol. A, 4 dr. Sol. B, and make up to 2 oz. with water.

One of the greatest advantages which glycin has over other developers is that the finest detail will never get blocked up by over-development; also the gradations are beautifully rendered. The formula first published by Jules Fuerst is probably the best, it is a simple solution, and made up as follows:—

Hot water	..	..	..	..	10 oz.
Soda sulphite	..	..	..	..	625 gr.
Pot. carbonate	..	..	..	..	1300 gr.
Glycin	..	..	..	..	250 gr.

The glycin must be added in small quantities at a time to avoid excessive effervescence. When cold, bottle the developer in 1 oz. or $\frac{1}{2}$ oz. bottles, filled to the neck and tightly corked. To use, add 3 oz. of water to each ounce of the above developer. Care must be taken that no hypo comes in contact with the glycin during development, or the plate will be badly stained. Much of the stain can be removed, however, after fixing, washing, and drying, by gently rubbing the surface of the film with a piece of soft wash-leather or rag moistened with alcohol.

Prints from photo-micrographs of every description must be made on a paper having a glossy surface, and for this purpose Albumen paper, P.O.P., or the Kodak Company's "Nikko" should be used. Nothing varies more than P.O.P. as to the amount of detail it will clearly show. In our hands, the best results have been obtained on "Solio," "Imperial," and "Ilford," but it is very difficult to beat a good fresh Albumen paper for quality of image and amount of fine detail. Very beautiful results are to be obtained with "Nikko," developed with Amidol, and this paper has the great advantage of being printed by artificial light, so that a supply of positives can be quickly produced at any season of the year. The greyish smears and marks which sometimes appear on this paper can be quickly removed, after the print has been washed and dried, by rubbing with a tuft of cotton wool soaked in alcohol.

Glass positives and lantern slides can be made on either collodion or gelatine. In experienced hands collodion gives the most beautiful results, and it is much to be regretted that it is not more largely used. However, very fine results are to be obtained on gelatine slides, if proper care in exposure and development be observed.



STEREO-PHOTO-MICROGRAPHY, POLARISCOPIC PHOTO-MICROGRAPHY, ETC.
A BRANCH of photo-micrography which is capable of yielding most beautiful and interesting results, but which has up to the present attracted little or no attention, is stereo-photo-micrography. Its neglect is, no doubt, largely due to the fact that very few up-to-date microscopists use, or possess, a binocular microscope, and therefore have not had an opportunity of fully realising the beauties and advantages of the stereoscopic image; otherwise they must surely sooner or later have desired to produce similar effects photographically.

The wide and rapid spread of high-power microscopical research is, no doubt, chiefly the cause of the binocular microscope having fallen into disuse and disrepute, the instrument being quite unsuitable for any work requiring a higher magnification than one hundred to one hundred and fifty diameters. Yet what a field of interesting and beautiful work that medium magnification covers! A world almost unknown to many amateur microscopists of to-day.

Any one possessed of a half-plate camera with a good length of bellows, and two or three micro-objectives of moderate magnification, such as a two-inch, one-inch, and half-inch, may practise the art of stereo-photo-micrography, the only additional apparatus required being a pair of Stephenson's binocular prisms. As stereo-photo-micrography comes under the head of low-power work, the microscope itself is not required, the prisms and objective being attached directly on to the front of the camera. Stephenson's prisms are frequently fitted to the compound microscope, when they are used as reversing prisms to facilitate dissecting operations and the arranging of small objects such as sponge-spicules, foraminifera, diatoms, &c., into groups or patterns. They are doubly useful to the photo-micrographer, as, by employing them, there is no necessity to cut and transpose the photographs, as is the case with ordinary stereoscopic work.

The Stephenson prisms can be obtained from any of the recognised makers of microscopes and microscopical accessories, such as Messrs. R. & J. Beck, of Cornhill, and Messrs. Baker, of High Holborn.

A small well-made box must be carefully constructed to carry the prisms and objective; or better still, if obtainable, a short wooden cylinder. In either case, the interior must be perfectly smooth and painted a dead black; and at one end must be fastened a lens flange for attaching the box or cylinder to the camera, and at the other end a "universal" screw to receive the micro-objective.

The prisms must be mounted within the box or cylinder in such a manner as to be immediately behind the objective, and as near to its back lens as is possible. The prisms should be fitted with two adjusting screws capable of being manipulated from the sides of the box or cylinder, so that the angle at which the prisms are inclined to one another may be altered if necessary.

A telescopic partition must be constructed to run through the length of the camera in an exactly central position.

The exposure required for a good stereo-photo-micrographic negative will be found to slightly exceed that allowed for ordinary low-power

work, as the light has to pass through the Stephenson prisms ere impinging on the sensitive surface of the plate. To obtain the best results, a full exposure should be given, so as to obtain vigorous negatives, full of detail and with good contrasts.

One of the most interesting, and at the same time most neglected, branches of photo-micrography is its application to the production of photographs with the aid of the polariscope. Considering the comparative ease with which both striking and beautiful results can be obtained, this is all the more surprising.

Probably this neglect is in many instances due to the non-possession of a polariscope, for that instrument is no longer considered the very necessary adjunct to the microscopist's outfit that it was a few years ago. There are fashions in microscopy, as there are in dress, and just now the polariscope is somewhat out of fashion.

Polariscopic photo-micrography essentially belongs to low and medium power work, the best results being obtained with the $1\frac{1}{2}$ -inch, 1-inch, and $\frac{1}{2}$ -inch objectives, and the Nos. 1 and 2 eyepieces. Higher magnifications, owing to the great loss of light, rarely give such satisfactory results. The greatest difficulty to be surmounted is to find the correct exposure to give the plate. The gorgeous display of colour—the masses of vivid red, golden yellows, and violets—is very apt at first to deceive the eye, and lead to considerable under-exposure of the negative. But if it is always borne in mind that by polarisation much light is lost, and that every angle of rotation of the prism on its axis still further varies the amount of light which falls upon the plate, there will not be very many failures.

And now a word or two as to objects suitable for polariscopic photo-micrography; they will be found to be far more numerous and easily obtainable than is generally supposed. The wing-cases and middle leg of the Great Water Beetle (*dytiscus*), or the leg of a cockroach are very pretty objects; and a thin section of a corn, finger or toe nail, cow's horn, horse's hoof, &c., give very nice results. But to our mind the most beautiful objects for this work are the carefully prepared and dry polyparies of the bryozoa and compound hydrozoa. Indeed, it is the method, *par excellence*, for displaying to full advantage and successfully photographing the beauties of these delicate and graceful objects. Plant and animal hairs, starches, and raphides also lend themselves to polariscopic effects.

A visit to the dark-room will yield many beautiful objects, such as crystals of pyrogallie acid, citric acid, and borax; indeed, there is practically an inexhaustible supply to be drawn from chemical crystals, exquisite forms being obtainable by the combination and recrystallisation of various chemical salts. Such slides the photo-micrographer can, with a little practice, easily prepare for himself; the crystals once formed on cover-glass or slip may be mounted, either dry, in Canada balsam, or, in a few cases, in castor oil.

The beautiful discs of salicin are prepared by placing on a glass slip a drop of a concentrated aqueous solution, and evaporating it over the flame of a spirit lamp until fusion just commences; a drop of Canada balsam dissolved in xylol is then applied, and a warmed cover-glass

gently lowered from one side, so as to drive out the superfluous balsam in an even wave.

The prismatic crystals of magnesium platino-cyanide, arranged in delicate rosettes, are obtained by evaporating slowly in a cool room a few drops of an alcoholic solution on the glass slip. If any attempt be made to evaporate from the alcoholic solution rapidly, or by the application of heat, the desired result will not be obtained. Octahedral crystals of strychnine may be obtained from a dilute alcoholic solution; a combination of a solution of picric acid and strychnine giving curious hook-shaped crystals. Beautiful crystals, resembling in shape the fronds of ferns, can be prepared by spreading evenly on a glass slip a small quantity of a solution of sulphate of iron.

A very remarkable series of crystallisations may be produced by allowing crystals of hippuric acid to grow under various conditions, such as in a dry atmosphere, a moist atmosphere, and while exposed to the vapour of alcohol, ammonia, benzole, and sulphurous fumes.

Other useful chemicals are ditartrate of potash, menthol, salicylic acid, sulphate of copper, chloride of barium, and quinidine. Slides of these crystals can be made from a strong solution in distilled water. If a little gelatine be added to the solution, larger and more beautiful crystals will frequently be obtained. Where it is necessary to mount in castor oil, the crystals should be evaporated on the cover-glass, a shallow ring of varnish run on the glass slip, and, when nearly dry, filled with castor oil; the prepared cover-glass carefully lowered into position, and pressed into contact with the cement; a final ring of varnish being run round the edge of the cover-glass to secure it, and prevent any possibility of leakage.

No one can work for very long at photo-micrography without discovering that there are certain beautiful and interesting objects, of which it seems well-nigh impossible to obtain a satisfactory negative. In every department of natural science such elusive objects are to be found, to the vexation and exasperation of the photo-micrographer. Nevertheless, there is no need for the ardent student to give up the attempt to obtain a satisfactory photograph of such specimens in despair, for in nine cases out of ten it may, with a little patience and manipulative skill, be most successfully accomplished. And this is more particularly the case if the object is suitable for low or medium power work. The difficulty is often to be overcome by the use of Rheinberg's system of multiple colour illumination; and the apparatus, which consists chiefly of coloured sheets of gelatine, can be purchased for something under half-a-crown, so it is certainly well within the reach of every photo-micrographer. The results that are to be obtained by this method of illumination are so remarkable, and frequently so helpful in deciding the exact nature of the structure of many objects, that it only requires to be better known to become highly popular.

Rheinberg's system of multiple colour illumination for microscopy consists of a series of perfectly transparent coloured discs placed either above or below the object to be examined; and by a careful blending of these colours it is possible to make an unstained object and its background appear of two totally different colours. Take a piece of green gelatine, and cut out a disc which will fit into the carrier used for hold-

ing the dark-ground illumination stops at the base of the substage condenser. In the centre of this green disc punch a hole one-third of its diameter in size. Now, in the centre of a clear unstained disc of gelatine fasten a piece of blue gelatine exactly the size of the hole punched in the green disc. Place the two discs together in the carrier beneath the substage, and examine with the one-inch objective a slide of diatoms, sponge spicules or foraminifera. The sight presented to our gaze is at once surprising and beautiful, the object standing out a beautiful green colour upon a deep blue ground. Different effects may be produced at will by varying the colours of the outer disc and central spot; the best colours being deep red, blue, purple, malachite green, and lemon yellow. Should there be no ring or carrier for stops beneath the substage condenser, the disc may be simply laid upon the surface of the condenser. Such, briefly described, is the first method of multiple colour illumination most suitable for examining or photographing specimens with the 2-inch, $1\frac{1}{2}$ -inch, and 1-inch objectives.

Suppose a specimen requiring a one-sixth objective to show it clearly is to be employed or examined, a slightly different method must be employed. An outer green disc with a red centre is placed in the stop carrier beneath the substage condenser. On looking through the microscope the whole field will now appear quite green in colour, which is due to the wide aperture of the lens admitting a wider cone of light than that proceeding from the central red disc. The iris diaphragm beneath the substage condenser is now gradually closed until the field appears nearly white or neutral tint in colour. The best result will be obtained by using a cone of light from the condenser that will about fill two-thirds to three-quarters of the aperture of the objective. Now place a slide of polycystina or diatoms upon the stage of the microscope and examine them. They will be found to stand out in a way they have never been seen to do before, gorgeous in tints of green and red. Careful examination shows that the ridges and slightly raised portions of the objects will appear green, while the lower portions and holes in the structure are red. Now this is of vital importance, particularly if the structure of diatoms is under consideration; for it is by this means possible to instantly and unhesitatingly declare whether certain marks are perforations or small raised prominences. The third method of illumination is produced by diffraction. The thinnest cover-glasses of such a size as will conveniently cover the back lens of the one-sixth and one-eighth objectives are coated with a collodion emulsion made by dissolving Schering's celloidin in equal parts of ether and alcohol, to which the dye, previously dissolved in absolute alcohol, has been added. When the emulsion has dried, the central, or outer, portion must be carefully scratched away, according to whether a central spot or outer disc of that particular colour is required. When this has been successfully accomplished the cover-glass is turned over, and its back coated with another coloured emulsion, which, when dry, may be treated in the same way; only the central or outer portion, according to which is required, being retained. By this means a series of combination discs can be readily produced. The most suitable stains for combining with the emulsion will be found to be malachite green, methyl blue, and fuchsine. Having prepared a cover-glass combination disc in the

manner just described, it is very carefully dropped into the objective so as to cover the whole of the back lens. The specimen to be examined or photographed is carefully focussed, and then removed. The sub-stage condenser must next be carefully focussed, so that on removing the eve-piece, the back lens of the objective is seen to be filled with light. With the eyepiece still away, the iris diaphragm attached to the substage condenser must be gradually closed, the manipulator looking the while down the microscope tube, until all the light is cut off from the outer portion of the disc, and only fills the central spot. The eyepiece is then inserted, and the object replaced upon a stage. If the above details have been properly carried out, a most beautiful result will have been obtained, the object standing out with almost stereoscopic brilliancy, and all details clearly and sharply defined. The three systems of multiple colour illumination above described will be found to cover a considerable range of magnification, viz., from about twenty diameters to five hundred diameters; the best results probably being obtained with magnifications about halfway between the two extremes. Those who have not the time to prepare their own discs, or who would prefer to purchase them ready made, may obtain them at a very moderate price from Messrs. R. and J. Beck, Limited, 68, Cornhill, E.C., and Messrs. Watson and Sons, High Holborn.

A difference in the length of exposure will, of course, be found necessary when employing multiple colour illumination as an aid to photo-micrography, but one or two experimental exposures will soon set the matter right.

[V.]

"MEDIUM TO HIGH-POWER PHOTO-MICROGRAPHY."

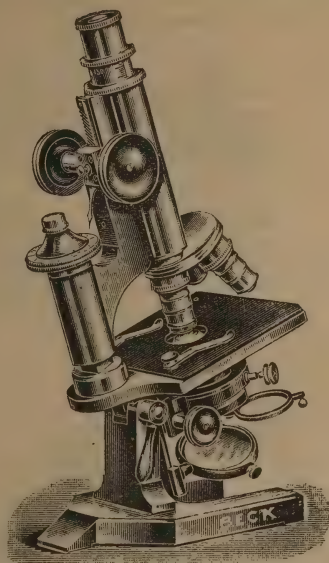
For medium and high-power photo-micrography, a microscope is, of course, absolutely necessary, the magnifications of the specimens to be photographed ranging from about 12 diameters to 550 in medium-power work, and from 550 to 2,000 diameters in high-power work.

As regards the necessary apparatus, the same rule applies to medium-power as to low-power photo-micrography, namely, that it can be as simple and inexpensive, or as elaborate and costly, as the purse and inclination will permit; and it is astonishing what good results may be obtained for a very small outlay. At first, it is most desirable that only apparatus which is absolutely necessary for the work in hand should be purchased; the little accessories and conveniences can very well wait—moreover, their aid will be better appreciated when sufficient experience has been gained to realise their value in helping to perfect or simplify the work.

The best plan is to decide upon the sum of money which is to be expended, and then look through the catalogues of the recognised makers of microscopes and find out, *not* how large a quantity of apparatus can be obtained for the price, but how and where we can obtain the best for the amount at our disposal.

The microscope itself is the most important piece of apparatus, and therefore the bulk of the initial outlay should be expended upon it.

It is far wiser to obtain a really good serviceable microscope at once, than a cheaper and inferior instrument which will have to be discarded later on. In the first place, a first-class instrument will last a lifetime with proper care, it will always be a pleasure to work with, and additional apparatus can be added to it from time to time, as the necessity or opportunity arises; whereas, with an inferior instrument, really satisfactory results will only be obtainable with great difficulty, if at all, and when at last it is discarded in disgust, probably most of the additional apparatus that has been added to it will not fit on to the new stand. Therefore it is better to get a good microscope stand



Beck's "London" Microscope. 11

and only one object-glass and one eye-piece than an inferior stand and several lenses.

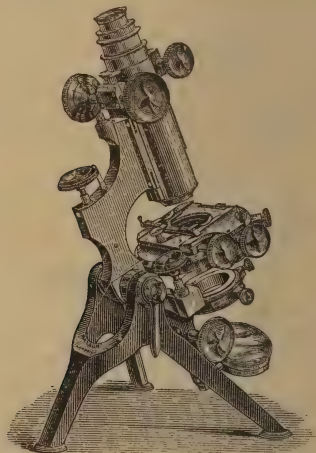
In choosing an instrument the tyro will do well to call in the aid of some one who is thoroughly familiar with the microscope and its construction. If, however, he has no microscopical acquaintance, he cannot do better than pay a visit to one of the old-established and recognised firms of microscope makers, such as Messrs. R. and J. Beck, Ltd., of Cornhill; Messrs. Baker, or Watson and Son, both of High Holborn, who have all high and world-wide reputations, and in whose hands he may safely leave the selection.

A serviceable microscope stand must be as solid and rigid as possible,

no matter at what angle the body-tube may be inclined. The body-tube and substage should be fitted with the standard thread and gauge of the Royal Microscopical Society, as all the lenses made by the best makers are fitted into mounts bearing this standard thread. The coarse-adjustment, for focussing with the low magnifying powers, should be by spiral rack and pinion; and the fine-adjustment for focussing with the higher powers, by fine micrometer screw.

Beneath the stage on which the objects to be examined or photographed are placed, there should be some form of mechanical substage to carry the substage-condenser and other apparatus.

Messrs. R. and J. Beck, Ltd., of 68, Cornhill, E.C., have lately placed on the market a most admirable series of microscopes at very reasonable prices, which will be found to meet all the above requirements. The

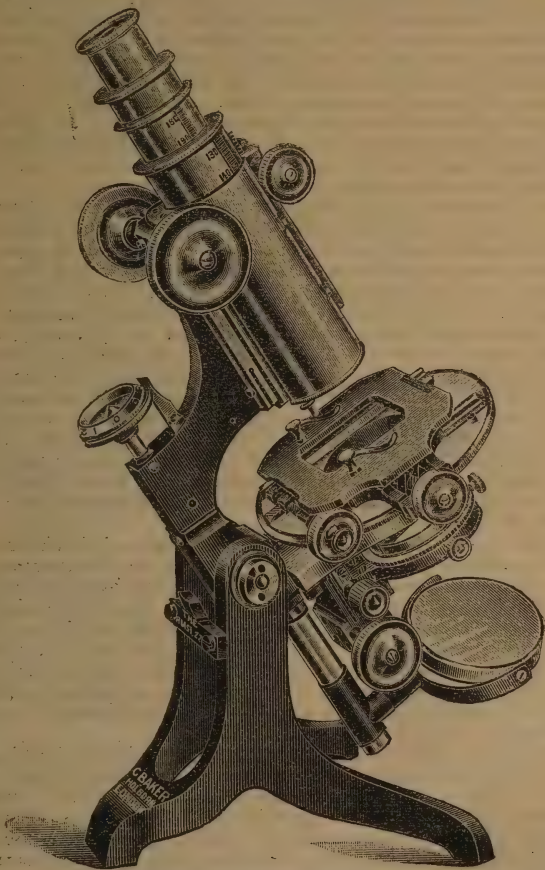


Watson's "Van Heurck" Microscope.

firm have given this series the title of the "London" microscopes. A great amount of care has been lavished upon the design, and the result is the production of a microscope of absolutely first-class quality throughout, the lenses and adjustments being sufficiently perfect to meet the most exacting requirements. The "London" is made in two sizes, and of the large model with its square stage, specially designed for the examination of Petrie dishes or culture plates, we can only speak in the highest terms of praise, after using one daily in research work for over a year.

One of the finest microscopes ever produced is Messrs. Watson and Sons' "Van Heurck" model. It was first made specially to the specification and order of Dr. Henri Van Heurck, the celebrated microscopist of the Botanical Gardens, Antwerp. It is designed to be of the highest efficiency for both photographic and advanced research work.

Photo-micrography, with high powers, demands the greatest convenience in the adjustments, and the very highest excellence in the mechanical working. This has been provided in this microscope, while the same perfection of movements, when the instrument is used



Baker's "R.M.S. 1:27" Microscope.

in the ordinary visual manner, renders it suitable for work of precision with large aperture objectives.

It is a microscope specially suitable for the laboratory, or where reliance has to be placed on results obtained, and to any one doing

original and accurate work, this instrument will be found the most convenient yet constructed.

The instrument throughout has been made with special patterns; every detail has been modelled for it, and no pains have been spared to render it unexcelled for high-power work and photo-micrography. The workmanship throughout is the very finest it is possible to produce. It is the instrument *par excellence* for the specialist engaged in original microscopical research work, and for the most perfect production of medium to high-power photo-micrographs. Another high-class instrument issued by Messrs. Watson at a lower price than the "Van Heurck" is the "Edinburgh" student's microscope, with tripod foot, and designed for photo-microscopic as well as research work. It is a great favourite with many eminent workers.

Messrs. C. Baker's R.M.S. 1-27 microscope is a very fine instrument, designed to meet the requirements of the specialist, and suitable for the highest critical work, and for photo-micrography. It has diagonal rack and pinion coarse movement, micrometer screw and lever fine adjustment, giving a movement of $0.11\text{m}/\text{m}$ ($\frac{1}{225}$ "") for each revolution of the screw, the milled head of which is divided into ten parts, each division numbered; two draw-tubes engraved in m , every tenth numbered, one of which is provided with rack and pinion adjustment, so that objectives may be corrected for cover-glass thickness, etc., It has a rotating mechanical stage giving a movement of $25\text{m}/\text{m}$ (1") in either direction graduated to $\frac{1}{2}\text{m}/\text{m}$ ($\frac{1}{50}$ ""). The centring substage has diagonal rack and pinion focussing coarse, and new form of fine can be conveniently controlled without shifting the hand; plane and concave mirrors. The whole mounted on a solid tripod stand with bracket to support the instrument in the horizontal position for photo-micrographic work.

The same firm's "Advanced Student's Microscope" is also an admirable instrument for photo micrographic work, and is more moderate in price. It has diagonal rack coarse and differential screw fine adjustment, with graduated milled head of $0.125\text{m}/\text{m}$ ($\frac{1}{80}$ "") for each revolution, draw-tube divided to millimetres, extending to $180\text{m}/\text{m}$ ($7\frac{1}{2}$ ""); large square cut-open stage with sliding bar graduated in vertical and horizontal directions for use as finder, stage clips; centring substage with diagonal rack and pinion focussing adjustment, plane and concave mirrors, the whole mounted on a solid tripod stand, with stop to support the instrument when in horizontal position.

The necessary objectives to cover the range of magnification in medium-power photo-micrography are, a 2-inch, 1-inch, $\frac{1}{2}$ -inch, and $\frac{1}{4}$ -inch, or to give their designation in millimetres, $40\text{m}/\text{m}$, $22\text{m}/\text{m}$, $12\text{m}/\text{m}$, and $4\text{m}/\text{m}$. Besides the objectives, three good eyepieces and a good substage condenser will be required. As the same substage condenser will probably have to do duty later on for high-power work, it is essential, if the best results are desired from it in both high and medium-power work, that a really good achromatic or apochromatic be purchased. The Abbe chromatic illuminator cannot be recommended for critical high-power work.

Whether apochromatic objectives and compensating eyepieces, or achromatic objectives and Huyghenian eyepieces, are to be used, depends

upon the length of the purchaser's purse. If only achromatics can be afforded, then buy only the very best English make.

An auxiliary condenser, to be placed between the illuminant and the back lens of the sub-stage condenser, will also be required. Though costing somewhat more than the ordinary "bull's-eye" condenser, the new aplanatic bull's-eye condenser, as suggested by Mr. E. M. Nelson, is most strongly to be recommended. It is designed to minimise the large amount of spherical aberration given by the ordinary stand condenser, and with it a considerably increased brilliance of illumination is obtainable, making it particularly valuable in photographic work, as its use not only shortens exposure, but materially improves the image.

The great difference in price between apochromatic and achromatic objectives is a very serious matter for most people contemplating taking up medium and high-power photo-micrographic work. For this reason, and to thoroughly test the matter, we have during the past year worked solely with a set of achromatic objectives, of first-class British make, in our microscopical research work, and in making the photographic records thereof. The result has been most satisfactory—we may say far in excess of our most sanguine expectations.

The camera employed in medium and high-power photo-micrography must gain its greatest extension by a backward movement, and should have a bellows extension of at least thirty inches, and the bellows should be the square form. A very serviceable baseboard, to carry the camera, microscope, condenser, and lamp, can be made at home for a small outlay. Procure a truly-planed 1-inch pine board, 5 feet long, and about 8 or 10 inches broad. Draw a perfectly straight and central line down one side, to act as a guide in centring the apparatus. Fasten by screws on to one end of the baseboard two blocks of wood, truly planed, each measuring 30 inches in length, and about 3 to 4 inches high. These will form part of the stage for the camera to travel along. Screw on to these supports a piece of $\frac{1}{2}$ -inch or 1-inch board, the same breadth as the camera, and 30 inches in length. Both the back and front of the camera can be attached to this board by clamps, fitting in a groove running down each side of the board, and enabling the camera to be pushed backwards and forwards to any desired extension. Care must be taken that the camera is accurately centred by the centring line on the baseboard. When racked out to its greatest length the focussing screen and dark slide of the camera should be flush with one end of the board. The camera centred, take the microscope and place it on the board at a little distance from the lens-flange of the camera, and bend the body back into a perfectly horizontal position, taking care that both the stand and the body of the instrument are central. The now horizontal microscope tube will probably be a good deal below the lens-flange of the camera; to rectify this, several thin books and journals (*THE BRITISH JOURNAL OF PHOTOGRAPHY* will do admirably), must be placed beneath the microscope to raise it to the proper height, when the microscope tube will be exactly in the centre of the opening. As the opening into which the photographic lens fits will probably be a good deal larger than the tube of the microscope, a smaller flange with a tube just large enough to slip over the microscope body tube must be made. This tube should be covered with a velvet hood,

with a piece of silk eye-glass cord run in, so that it may be drawn tightly over the junction between the two tubes, and prevent any light getting through into the camera to fog the plate.

Screw the 1-inch object glass on to the microscope, and remove the eye-piece; swing the mirror away to one side, and place the photo-micrographic lamp and bull's-eye condenser in such a position as to evenly illumine the field, which should appear on the centre of the ground-glass focussing screen of the camera as a bright circular disc.

Having made sure that the circular field of view on the ground glass screen is perfectly central, carefully measure the exact height of the



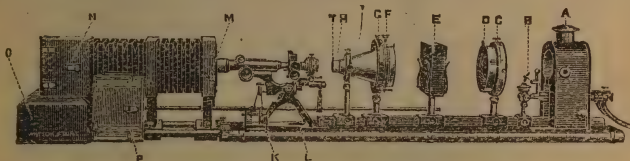
Medium-power Photo-micrograph.—Stem of Pine (1st year). X. 25.

pile of journals, and build a wood stage of that height, to which the microscope can be securely fastened. While the microscope is still in its proper central position on the board, take two fillets of wood and screw them, one on each side of the foot of the microscope stand, on to the baseboard, so as to form a perfectly central groove into which the microscope can be pushed. If this is done carefully, the microscope when placed between the two pieces of wood will always be central with the camera, and thereby much time and labour will be saved. The box or stand for the lamp used for illuminating the object to be photographed may with great advantage be centred in the same manner.

A simple but effective arrangement for finally focussing with the "fine adjustment" may be made in the following manner:—Procure

from the ironmonger two of the small brass brackets generally used for fixing up light roller-blinds; on to the right hand side of the base-board, and almost flush with the camera, screw one of the brackets, fastening the other in a line with the first on the same side of the board and just beyond the coarse-adjustment. Now obtain a thin brass rod, about three inches longer than the intervening space between the brackets, and thread it through the hole in each bracket intended for the ends of the roller-blind to fit into. A small wood or metal wheel, with a groove turned round the top, must be fastened on to the brass rod exactly opposite the fine-adjustment of the microscope; a similar wheel must be fastened at the camera end of the rod to act as a handle for focussing. A silk cord, which has been rubbed on a piece of resin to make it "bite," is fastened into a loop to go over the fine-adjustment milled head of the microscope and the wheel of the focussing-rod. It must only be just tight enough to "bite" the milled head and wheel, so that they revolve when the focussing-rod is gently turned, but must on no account be so tight as to produce any strain or pull upon the delicate fine-adjustment of the microscope.

A piece of cardboard, which can be placed either between the object-glass and the specimen, or, if the $\frac{1}{4}$ -inch or $\frac{1}{8}$ -inch object-glass is being

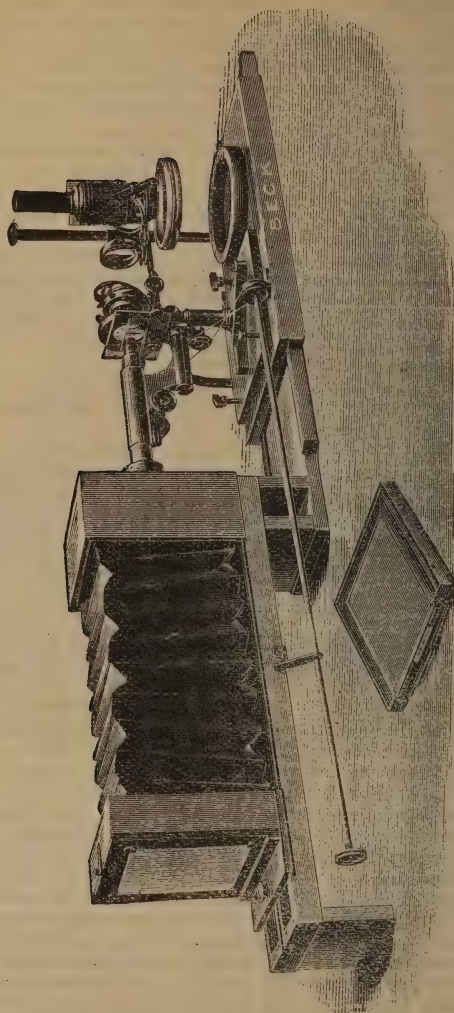


Springer's Photo-Micro Apparatus.

used, directly behind the stage of the microscope, forms the best shutter for cutting off the light when placing the dark slide in the camera and making the exposure.

Those who have not the time or the inclination to make their own camera outfit will find that they can purchase at varying prices desirable apparatus for their work. Messrs. R. and J. Beck turn out a very useful medium-power horizontal photo-micrographic camera, intended for use with their special lamp, and a handy vertical form.

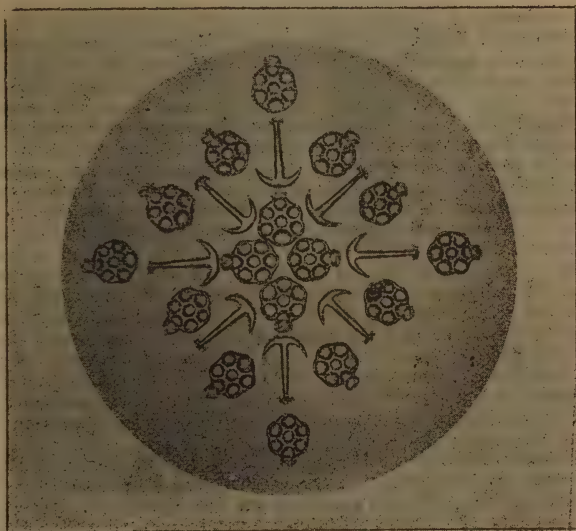
Messrs. Watson and Sons have several very useful photo-micrographic cameras, at prices to suit most purses. Their "Student's" photo-micrographic camera we can strongly recommend for good all-round work. It is fitted with a bellows body, extending to 30 inches, the base of the camera having a divided scale let into it, so that the distance between lens and plate may be accurately known so as to obtain any desired amount of amplification; it has a rod running from the back of the camera to the front, to attach to the fine-adjustment, for focussing from back of camera; fitted with a new pattern projecting detachable front for holding microscope and lamp; this consists of two boards, one rotating on top of the other, on metal centres. The microscope being fitted on the projecting front, the board carrying the instrument, etc., can be turned half-way round for adjustment visually, and the object



Beck's Student's Photo-micrographic Camera.

fixed in position ready for photography; the board is then turned back, and locks central with the front of the camera. In this way the object can be perfectly adjusted without inconvenience.

For high-power work of the most difficult and advanced description, Messrs. Watson have produced an outfit designed by Mr. E. B. Stringer, B.A. The baseboard is confined to that part of the apparatus carrying the illuminating system and microscope, the end of the camera being supported upon a massive wooden block. To this are attached two large brass tubes, on which slide the supports for the bellows, and which themselves slide in slightly larger tubes attached to each side of the baseboard. A door is provided at the side of the camera for the exami-



Medium-power Photo-micrograph.—Pl. tes and Anchors of Synapta. X. 75.

nation of the image *in situ*, when a white card is substituted for the ground-glass screen.

The condensing system and illuminating apparatus are carried as in an optical bench, upon a square brass bar mounted on the baseboard. The oxyhydrogen-zirconium light from the jet, which is enclosed in the Russian iron lantern when working, is parallelised by a doublet condenser, the lenses of which are $4\frac{1}{2}$ inches and $4\frac{1}{4}$ inches in diameter respectively; immediately in front of this combination is an iris diaphragm. The beam then passes through the light-filtering media placed in a holder, and enters a plano-convex lens $4\frac{1}{4}$ inches in diameter, by which it is converted into a converging cone. A brass cone is used as a chamber containing water, which eliminates heat rays and assists

in the correction of the system. A smaller plano-concave lens of highly dispersive glass, achromatising the whole system, again parallelises the beam, and a slightly divergent pencil of great intensity, rather less than an inch in diameter, enters the substage condenser of the microscope.

The whole of the condenser system is fitted with screws for centring and clamping fittings and screws for attachment to the bar on the baseboard. After exact adjustments have been made, everything is clamped firmly and is always available for use without fresh arranging. The microscope is not fixed to the baseboard, but the toes sink in recesses in a triangular base-plate, which has provision for centring. The same stand can, therefore, be used for either visual or photographic work. An attachment is made to the fine adjustment of the microscope by means of gear and pulley wheels attached to a rod working from the side of the block.

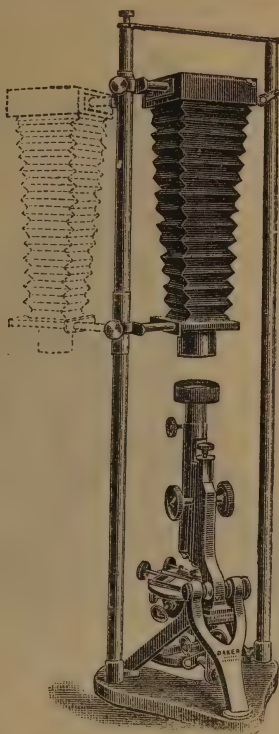
The firm of C. Baker, of High Holborn, also make a very excellent large horizontal apparatus; the camera is made of French polished mahogany, size half-plate, 165 mm. by 120 mm. ($6\frac{1}{2}$ inches by $4\frac{3}{4}$ inches) closing to 15 cm. (6 inches) and extending to 91.5 cm. (36 inches), with ground and plain glass focussing screens; double dark slide, with carriers for quarter-plates; two metal diaphragms giving circular pictures 100 mm. (4 inches) and 76 mm. (3 inches) diameter; exposing shutter, light-tight connection for joining up camera and microscope, the whole mounted on a platform fitted with runners, so that either the front or the back can be moved and clamped in any desired position, with graduated scale affixed to one runner; the platform is itself mounted at one end of a teak baseboard, 183 cm. (72 inches) long, 30.5 cm. (12 inches) wide, 32 mm. ($1\frac{1}{4}$ inches) thick, and a revolving table at the other carrying the microscope, condensing system and illuminant; these can thus be swung out for the preliminary visual adjustment, and afterwards rotated into position and clamped. A rod readily detachable, when it is desired to rotate the turntable, and connected with the fine adjustment by a cord, runs the whole length of the camera, so that the final focussing can be effected while observing the image on the screen.

For certain work a vertical camera is absolutely necessary, and this form is certainly becoming more popular in England; hitherto it has been much more generally employed on the Continent. Dr. Van Heurck has done all his most delicate high-power work with the vertical form; and Messrs. Watson are now making one similar to that used by him. It is exceedingly rigid and efficient, and can be immediately put over the microscope without necessitating readjustment. The tube of the microscope is attached to the base of the camera by means of a leather bellows. On one side of the camera body a door, having light-tight fittings, is placed, so that the head can enter the camera, and the eye placed to the tube of the instrument to make the adjustments; the door is then closed, and final focussing is done on a screen at the top of the camera. The firm are also issuing a combined vertical and horizontal camera, which is a very useful piece of apparatus for all-round work.

Messrs. C. Baker have a very useful small vertical apparatus, the camera being mounted on a strong brass upright, so that it can be

adjusted to any height, and swung aside in order to make the preliminary visual adjustments. The upright is mounted on a heavy iron base, upon which the microscope is placed.

In commencing medium-power photo-micrography it is advisable to restrict the first attempts to the lower magnifications, and gradually work upwards, as by this means more real and rapid progress will be made. Photographs should be taken with and without the eyepiece.

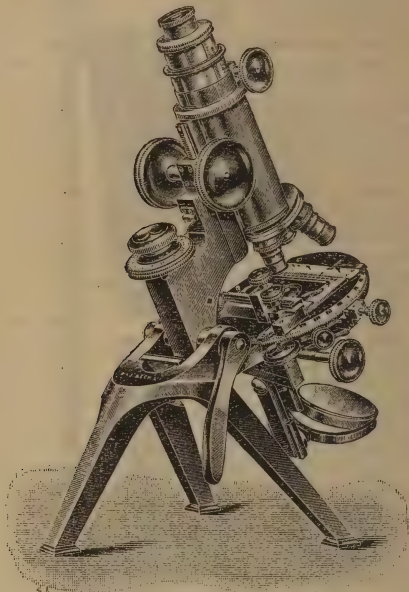


Baker's Vertical Camera.

Examination of the disc of light on the ground-glass screen of the camera, when the eyepiece of the microscope has been removed, will reveal the presence of an inner bright ring of light, due to reflection within the body-tube of the microscope. Although it may not be very noticeable on the focussing screen, this bright ring will make itself unpleasantly visible on the negative. To prevent this, a velvet-covered

cardboard tube exactly fitting inside the body-tube of the microscope must be purchased or made at home.

Camera, microscope, and lamp, placed in position, the first attempt at medium-power photo-micrography is made. The one-inch object-glass is screwed on to the microscope, the eyepiece removed, and the velvet hood carefully fastened on to the body-tube of the instrument, and the lamp lit and centred so that the whole field of view is evenly illuminated. On the stage of the microscope is placed the object we wish to photograph. Extend the camera bellows to 10 inches, and focus the object roughly on the ground glass screen, using the coarse adjust-



Beck's "Imperial" Microscope.

ment of the microscope for the purpose. Now substitute the sheet of plate glass for the ground glass, and connect the fine adjustment with the focussing-rod by means of the silk cord. Examine the image on the plate-glass screen with the aid of the hand focussing-glass, gently turning the focussing-rod round to right or left until the object is perfectly sharp. Place the card in front of the object-glass to cut off the light, insert the dark slide in the camera, and proceed to expose the plate, taking the greatest care when removing the card not to touch or jar the apparatus, or the table on which it rests, in any way. The length of exposure will depend entirely upon the speed of the plate used, the actinic power of the illuminant, and the transparency of the

object. Supposing the plate to be a backed Edwards' instantaneous isochromatic, the light a good paraffin microscope lamp, and the specimen, say, a good thin section of a plant stem, mounted in Canada balsam, from twelve to fifteen seconds will be about the right exposure.

The successful production of high-power photographs is the great ambition of every photo-micrographer. It is the most difficult and exacting branch of his work, and is only to be accomplished by the intelligent use of the most perfect apparatus, coupled with knowledge gained by practical work and experience. Microscope, objective, eyepieces and condensers must all be of the best quality if the results are to reach a high standard of excellence.



High-power Photo-micrograph.—Typhoid Bacillus. X. 1000.

For high-power and critical work, Messrs. R. and J. Beck have just placed on the market an entirely new microscope, which has several important features, which make it an ideal instrument for the most delicate research work and high-power photo-micrography. The stand is full sized, and made with either the Continental horse-shoe foot or the English tripod. The main body-tube has a diameter of no less than 2 inches and a length of only $3\frac{1}{2}$ inches, whilst with nose-piece and closed draw-tubes included it measures $5\frac{1}{2}$ inches long. The great advantage of a wide body tube is obvious to all photo-micrographers, and in thi

instrument the nose-piece and draw-tubes can be removed and a wide angle photographic lens mounted for low-power work. There are two draw-tubes, one of which is controlled by rack and pinion, and has the universal screw at its lower end. Both tubes are graduated in millimetres, and they give a total extension of 260 mm. The diameter of the tube is R.M.S. No. 4 gauge, 1.41 inch, which is the largest size, and an adaptor takes the No. 1 size, .917 inch. This enables a large field to be used with low-power eyepieces. The coarse adjustment is the usual form, but the milled heads are large, and when at its highest point the nose-piece is over 4 inches from the stage. The fine adjustment is the new



High-power Photo-micrograph.—Diphtheria Bacillus. X. 1000.

two-speed arrangement of Mr. A. Ashe, in which two milled heads rotate upon the same axis. The upper milled head gives a movement of $\frac{1}{60}$ -inch per revolution, and the lower a movement of $\frac{1}{360}$ -inch per revolution. The advantages of those two movements are obvious. The mechanical parts of both the stage and substage are all that can be desired. The name of this most excellent and high-class instrument is the "Imperial," and it is an ideal microscope for the specialist and advanced worker.

The most frequent difficulty met with when photographing bacteria is to obtain a brilliant and strongly-contrasted negative. The real cause of this trouble lies in the fact that the dyes with which these organisms

are stained, though *visually* producing a striking contrast by the differentiation of colour renderings between the organisms and the background, do not affect the photographic plate in anything like the same degree. The only way in which this difficulty can be successfully vanquished is by doing all that is possible to accentuate the contrast between the bacilli and the background; and this can to a very great degree be successfully accomplished by the use of isochromatic plates stained with dyes to render them more sensitive to the various colours, and by the interposition of a colour screen between the source of illumination and the substage-condenser. Messrs. Lumiere's series of isochromatic plates will be found a great boon in this department of photo-micrography, as they are sensitive to yellow and green, yellow and red, and yellow, red and green. Suppose a photo-micrograph has to be made of a slide of bacteria, in which the bacilli are stained red and the nuclei blue. If a green glass screen be placed in front of the lamp, and a green-stained Lumiere plate be used, a negative giving bold and brilliant contrast will be obtained. Should this subject be attempted with an ordinary plate, however, the resulting negative will be a wretched failure.

When a great deal of microscopical and photo-micrographic work has to be done, a screen made of a saturated solution of acetate of copper, held in a glass cell $\frac{3}{4}$ inch thick, 4 inches deep, and 3 inches broad, should be placed between the source of light and the substage-condenser. The gain in definition and comfort in working is simply enormous, and once adopted, this screen will be always employed.

Slides of bacteria from which photo-micrographs are to be made should be much more deeply stained than is usual for mere visual examination. Before the final focussing and exposure of the plate the whole apparatus must be allowed to become thoroughly warmed, so that there may be no fear of expansion and alteration of focus during exposure.

Lastly, let the photo-micrographer be patient and determined to reach the highest standard he can set; let every failure be an object lesson in what to avoid, and at last his efforts will be crowned with the success they deserve.

BIBLIOGRAPHY.

[THE TRANSACTIONS OF THE MICROSCOPICAL SOCIETY OF LONDON.

New Series, Vol. I., 1853, p. 57: "On the Application of Photography to the Representation of Microscopic Objects." By Joseph Delves, Esq. Communicated by Mr. Bowerbank. (Read October 27, 1852.)

New Series, Vol. III., 1855, p. 1: "Some Remarks on Obtaining Photographs of Microscopic Objects, and on the Coincidence of the Chemical and Visual Foci of the Object Glasses." By F. H. Wenham. (Read November 22, 1854.)

New Series, Vol. XI., 1863, p. 9: "On the Photographic Delineation of Microscopic Objects." By R. L. Maddox, M.D. (Read November 12, 1862.)

New Series, Vol. XIII., 1865, p. 34: "Photomicrography, its Application and Results." By R. L. Maddox, M.D. (Read March 8, 1865.)

JOURNAL OF THE ROYAL MICROSCOPICAL SOCIETY (LONDON).

Vol. I., 1878, p. 197 : "On Examining and Photographing Bacteria." (Notice of an article by Dr. Koch, of Posen, in Cohn's "Betragen zur Biologie der Pflanzen," Bd. II., Heft. 3.)

Vol. I., 1878, p. 213 : "Oblique Light in Photomicrography."

Vol. II., 1879, p. 62 : "Improvements in Microphotography." Photomicrography, Stein. 1879, p. 62.

Pleurosigma Ang. Phot., Gunther. 1880, p. 1085.

Photomicrography, High Amplif. 1881, p. 127.

Bacteria Photographing, Kaschka. 1881, p. 851.

" " Sternberg. 1881, p. 852.

Photographing Bacteria, Sternberg. 1882, p. 571.

THE JOURNAL OF THE QUCKETT MICROSCOPICAL CLUB (LONDON).

Vol. I., 1868-69, p. 18 : "Microscopic Photography."

Vol. I., 1868-69, p. 183 : "On some of the means of Delineating Microscopical Objects." By W. T. Suffolk. (Read January 22, 1869.)

Vol. IV., 1874-77, p. 230 : Microphotography in the United States in "On Microscopy in the United States of America." By Henry Crouch, F.R.M.S. (Read December 22, 1876.)

THE LIVERPOOL AND MANCHESTER PHOTOGRAPHIC JOURNAL.

New Series, Vol. II., 1858, p. 275 : "On the Photographic Delineation of Microscopic Objects." By Mr. Reeves-Traer, M.R.C.S., Ect.

BOOKS ILLUSTRATED BY PHOTOMICROGRAPHY.

Donne and Foncault's Atlas Mic. Anat. Daguerreotype. 1845.

Atlas der Allgemeinen Thierischen Gewebelhre, Von Hessling und Kollman. 1861-62.

Die Photographie als Hulfsmittel Mikroskopischen, Von Gerlach, 1863.

Sections of the Spinal Cord, Dean U. S. Smithsonian contrib. 1864.

Alkaloids, Helwig. 1865.

Rouget's Photomicrographs of the Tissues, *Br. J. Phot.*, July 6, 1866.

La Photographie, appliquee aux recherches Micrographiques. Par A. Moitessier. Paris, J. B. Baillière et Fils, 1866.

Atlas Roudanowski (2 ed., folio). 1876.

Funke und Thelen Microphotograms. 1876.

Lehrbuch der Mikroskopischen Photographie mit Rucksicht auf naturwissenschaftliche Forschungen, Von Oscar Reichardt and Carl Sturenburg. Mit 4 photographischen Abbildungen, Leipzig, Verlag von Quandt und Handel, 1868.

Recklinghausen und Meyer Phot. Mic. of Path. Anat. 1878.

Micro-Photographs in Histology, Normal and Pathological. By Carl Seiler, M.D., in conjunction with J. Gibbons Hunt, M.D., and Joseph G. Richardson, M.D. Macmillan and Co., 1876, 1878.

Fritsch and Müller's Diatom Prints. 1878.

De Barry Photomicros of Botanical Subjects. 1878.

Cohen und Grimm Photomicros of Minerals and Rocks. 1881.

Recherches sur l'Appareil Tegumentaire des Racines, Spl. and 50, Micro. Phot., Paris. 1881.

Norris Phys. and Path. of the Blood, Photos. 196. 1882.

Mason Central New Syst. of Rep. and Batrach., Amer., ill. 113, Phto. Mic., 4to. Newport, U.S.A. 1879-82.

Kupffer und Benecke—Photomicros. Embryos of Birds. 1882.

Magnin and Sternberg, Bacteria (2nd ed.). 1884.

Photomicrography. By E. C. Bousfield, L.R.C.P., London.

Photomicrography. By Andrew Pringle, F.R.M.S.

Photomicrography. Edmund J. Spitta, L.R.C.P., Lond., M.R.C.S., Eng., F.R.A.S.

An Atlas of Bacteriology, containing 111 original photo-micrographs with explanatory text. By Charles Slater, M.A., M.B., and Edmund J. Spitta, L.R.C.P., Lond., M.R.C.S., Eng., F.R.A.S.

Photo-Micrography; or How to Photograph Microscopic Objects. By J. H. Jennings.

First Steps in Photo-Micrography: A Handbook for Novices. By F. Martin Duncan, F.R.H.S.

BOOKS ON THE MICROSCOPE AND THE PREPARATION OF MICROSCOPIC
OBJECTS, USEFUL TO THE PHOTO-MICROGRAPHER.

"The Microscope and its Revelations." Carpenter-Dallinger.

"The Microscope." Hogg. (New. Ed.)

"Modern Microscopy; A Handbook for Beginners." Cross and Cole.

"Methods and Formulæ for the Preparation of Tissues for Microscopical Examination." Squire.

"A Popular Handbook to the Microscope." Wright.

"How to Work with the Microscope." Beale.

ALBUMINISED PAPER: HOW TO PREPARE IT.

BY HORATIO NELSON KING.

THE various articles in THE BRITISH JOURNAL OF PHOTOGRAPHY on the use of albuminised paper and the frequent questions asked repeatedly in the same respecting its use, seems that many who have been using the various printing out papers are anxious to try their hand with albumen. My advice is, do so, and you will not regret it. For over half a century I have used it and still do so. Try a couple of prints on the same negative, printing an equal depth, one on albumen and one on P.O.P. Then note the results, look at the detail in the shadows. You will find the albumen vastly superior. Fifty years ago I albuminised my own paper, using fresh eggs. The salting solution was more than double the strength now used, and the silver solution was from 90 to 100 grains. Now seldom more than half is used. Long soaking of the print was not given, but many and frequent changes of water and more permanent prints. Some years ago I gave the formula I constantly use. However, the army of photographers has grown enormously since then, and it may be of service if I repeat the same:

No. 1.

Water, rain or distilled	120 ounces.
Nitrate of Silver	10 "
Pure Nitrate of Soda	5 "
Loaf Sugar	$\frac{1}{2}$ "

This forms the stock solution. To sensitise 36 full sheets of paper make a second solution of

No. 2.

Water	10 ounces.
Pure Nitrate of Soda	1 "
Nitrate of Silver	2 "
Loaf Sugar	2 drachms.

Take 2oz. of No. 2 and add to No. 1; float four minutes, blot off and dry then after four sheets of paper have been floated add 1oz. more, and gently rock the whole. Repeat this after every four sheets, when the 10oz. of No. 2 will suffice for the 36 sheets, leaving the No. 1 bath pretty nearly to its original 120oz. By this method each sheet will be kept to its proper strength. A little kaolin kept in the bottle will always keep it clear. I have the paper rolled up in quires, sufficient being prepared for two or three weeks' use. Keep one sheet always as an outside one; no matter how dark this may get it will be a great preventive of discoloration. I have it kept in tins used for platinotype papers. If slightly discoloured it will in the fixing bath, which should always be fresh, come out perfectly white. If an extra glaze is required, squeegee the prints on the black or brown American metal plates sold by all dealers, about 13in. by 11in., putting the plate in water and laying the print on it, place a sheet of blotting paper on the same and a sheet of india-rubber over this, and squeegee, and when dry it will leave the plate, which when cleaned can be repeatedly used. Try it and you will be convinced of the superior results of the albuminised paper.

LIFE-SIZE SNAPSHOTS OF SMALL LIVING SUBJECTS.

DIRECT PHOTOGRAPHY VERSUS ENLARGEMENT.

(By CHARLES LOUIS HETT.)

WHEN the subject is a caterpillar or moth, it is generally possible to give a prolonged exposure with a fairly small stop, and thus to obtain a life-size negative direct.

Birds and quadrupeds are much more lively, and snapshots are essential. In the case of direct life-size photography a very large



aperture must be used to counteract the short exposure. A large aperture means very little depth of field, becoming less and less as the scale is increased, until it reaches its maximum at life size. The foregoing is sufficient to show that life-size snapshots of lively subjects would be attended with great difficulties. Experience has shown that these difficulties are, to a great extent, overcome by taking a negative to a reduced scale and again enlarging it. Although this is generally known, I have never seen any theoretical inquiry into the subject. I have, therefore, worked out the following problem. With any given lengths of exposure, what relation does the depth of field bear to the proportion between the original image or subject, the aperture being so adjusted that an equal amount of light will act on the film in each

case. I have already shown ("Almanack," 1901, p. 809) that the depth of field is approximately

$$\frac{er(r+1)}{50}$$

where $e = f$ value of aperture, that is for F8, $e = 8$.

$r =$ ratio of subject to image.

In producing a negative which after being enlarged, r diameters, gives



the same sharpness as a plate taken direct, the permissible circle of confusion must be reduced in a like proportion. That is, the above formula must, for this purpose, be divided by r .

That is depth of field (in taking small negatives) $= \frac{er(r+1)}{50r} = \frac{e(r+1)}{50}$

Eliminating the constant 50 the depth of field will be proportional to $e(r+1)$.

The question of aperture necessary to give the same amount of light action (with equal exposure) has now to be considered. It is evident

that each value of r will require a new value of e to give the same illumination, call this new value e^1 , then

$$e^1 + \frac{e^1}{r} = e \therefore e^1 = \frac{er}{(r+1)}$$

Substituting this value or e^1 in the above formula we find that the depth of focus varies in the proportion of $\frac{er \times (r+1)}{(r+1)} = er$ as e is constant whatever the value of r it may be omitted.

Then the depth of field in the final enlargement increases in the same proportion as the reduction in the original negative (practically but not absolutely).

Practical considerations prevent the preliminary reduction from being carried to the extreme. In the case of small birds I have, after trying other proportions, adopted one-fourth life size as my standard scale.

Objection may be taken to my calculations, based on an empirica permissible circle of confusion of $\frac{1}{100}$ inch. Let us, therefore, see how my original formula compares with practice. Some years ago Mr. Duffield published illustrations of a frog and toad on a large scale. The following are the particulars:—

Distance from camera to object about 6ft.

Aperture, f 21.

Equivalent focus of telephoto, 33".

The scale is about .8 life size, and $r=1.25$.

Therefore, depth of field = $\frac{21 \times 1.25 (1.25 + 1)}{50} = 1.18$.

This agrees very closely with the depth of focus in the illustrations estimated from the ground space occupied by the reptiles.

Among amateur bird photographers few attempt to work to any given scale. But the general practice is not to exceed one-fourth life size. Herewith I enclose prints of a young spotted flycatcher from original negative, and from enlargement to life size.

LEAF PHOTOGRAPHY.

By J. H. BALDOCK, F.C.S.

NOTHING serves better to remind one of the rapid advance of time than the annual appeal of the Editor of the *British Journal of Photography* for an article to his world-wide ALMANAC; and in answer to such appeal I venture to pen the following lines:—

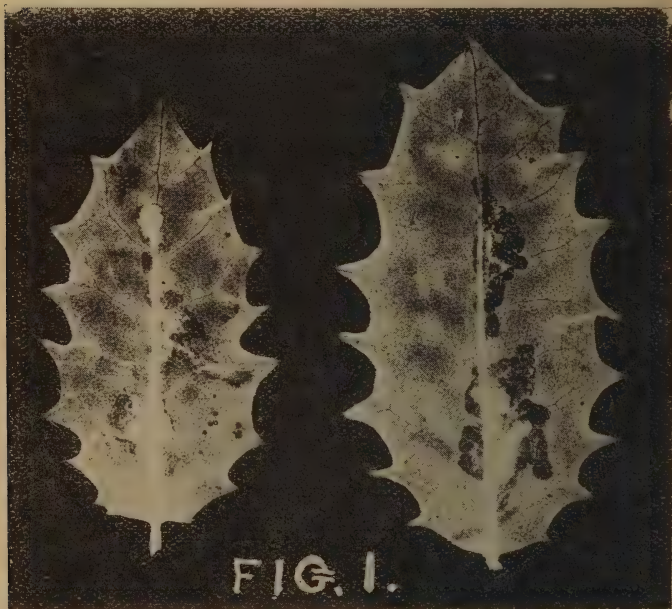
Although I call this article "Leaf Photography," it applies to any thing which either is, or can be made to lie, flat like a leaf; the subject was referred to by my friend Mr. H. D. Gower some two or three years since, and it occurred to me that it might be of some practical use and application, and hence I chose it for the subject of this communication, leaving it to your numerous readers to say how far it might be further elaborated.

Most of us doubtless remember how, years ago, when we were boys together, it used to be an amusement to get a piece of sensitive paper, and print on it with some leaf or other, fern leaves, from their beauty

being perhaps the favourite. In this way was got an impression of the leaf on a black ground.

The accompanying illustration, Fig. 1, shows this very plainly, and for my present purpose I shall call this the "Negative," because in every case this constitutes the first part of the process, and therefore it is not necessary to show but this one, it being understood that all the other illustrations, which I shall call "Positives," have been obtained from similar negatives.

The object of these illustrations, excepting Fig. 6, is to show in a manner which I believe is superior to any other method, because the

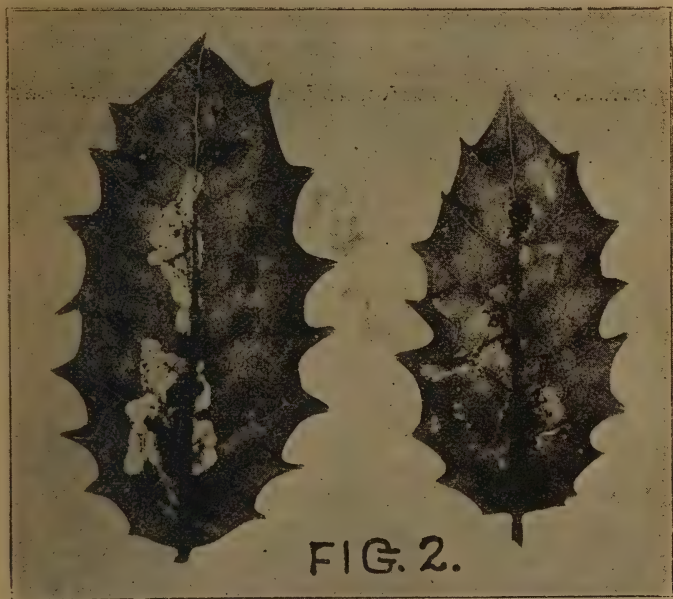


leaves have, so to speak, taken their own photograph. In Fig. 1 we have the leaves of the holly, *ilex aquifolium*, the substance of which has been eaten away by the larvæ of some fly, or other insect, probably *phyto-myza ilicis*, leaving both the upper and lower surfaces untouched. How, then, do we proceed to get this "Negative"? Look among bushes of holly till leaves are found which have been attacked as described, gather some of these, and select those which show best, place them between blotting-paper, and put them under pressure, a letter-press answering very well indeed. In a day or two, when they have become flat and partly dry, lay them on a piece of plain glass in a printing-frame, and place over them

a piece of printing-out paper, putting the frame in a good light, and there leave it until such time as the desired details are printed dark enough.

This takes some time even in sunlight ; in fact, it is hardly possible to overprint with most leaves, but one precaution is necessary, because, in examining the progress of printing, there is a risk of shifting either paper or leaf ; this must be therefore done carefully, raising the paper a little bit at a time, and noticing that it exactly covers the leaf when it goes back. It is not really difficult, and I have not had one print go wrong on this account. When the leaf is printed dark enough the rest of the paper will be black and bronzed round the edges of the leaf ; at this stage remove it, wash, tone deeply, fix, wash, and dry as usual, you then have the "Negative."

To obtain the "Positive," Fig. 2, all that is necessary is to place the



negative on a piece of glass, then the printing-out paper, and proceed as usual for any other negative. The printing takes some time, but there is now no risk of movement during examination. In this way a very beautiful print is obtained, showing every detail, and the venation of the leaf perfectly, though this I fear will not be very apparent in these reproductions, as the paper is not suitable for the purpose.

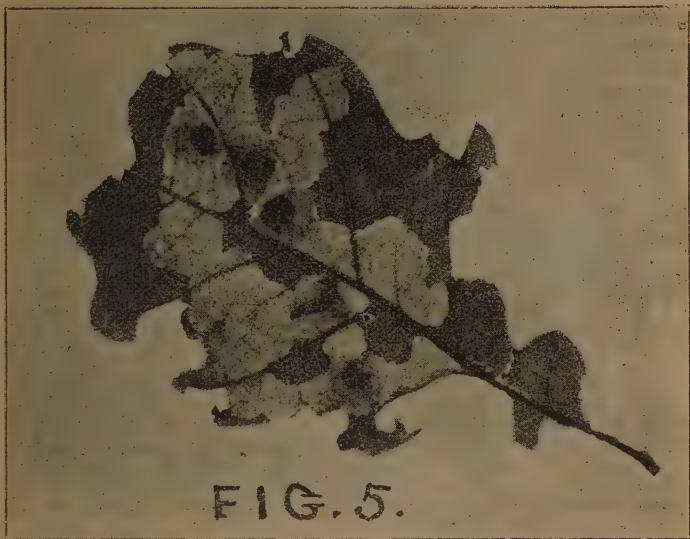
Everyone knows the ravages produced in the leaves of the celery and



parsnip by the larvæ of *Tephritis onopordinis*, and the accompanying illustration, which represents a celery leaf, shows this very well. In some cases very serious damage is done to the crop when the leaves are badly attacked. It is only necessary to look over a bed of celery or parsnips, say, about September or October, and plenty of leaves will be found suitable for the purposes of this paper.

The illustration, Fig. 4, is an interesting one, especially as regards the middle leaf, which shows most distinctly the onward march of one of the little depredators.

The course followed was a circular one, following the outline of the leaf, and, after being under pressure for two or three days, the larvæ were still alive, and with the aid of a pocket-lens could be seen to move.



The head was at the point marked with a little cross. The leaves here represented are those of the *chrysanthemum leucanthemum*, or ox-eye daisy. The left-hand leaf, it will be seen, is almost eaten away, the larvæ having apparently made their escape from the edges of the leaf.

In the next example, which is the leaf of an oak tree, Fig. 5, we have presented to us no less than three different attacks made on the leaf, and it is well known that the oak is very subject to attacks of this sort, especially galls, so much so, that Mr. E. Connold, in his classic work on "British Vegetable Galls," merely refers to the subject, contemplating writing a book dealing almost exclusively with oak galls.

In this example, it will be noticed, the leaf is eaten away at its edge,

its substance is burrowed into, and there are circular scales on its lower surface, so that, altogether, but little of the original leaf remains. The insects which produce these ravages usually belong to two distinct groups, i.e., the sypterous and micro-lepidopterous larvæ, either lay their eggs on the surface of the leaf or pierce the epidermis with their ovipositor, and so lay the eggs in the substance of the leaves, just in the same way that, for instance, ichneumon flies deposit their eggs in the bodies of certain caterpillars. If the larvæ have escaped from the leaves, it is not always easy to determine which it was,



because some larvæ attack different leaves, while some leaves are attacked by different larvæ.

Of course I could go on multiplying examples almost indefinitely, but the foregoing will amply suffice to enable anyone to follow out the idea, besides which I am much afraid I am already taking up too much space, therefore I will conclude with my last example, which is no less interesting in its way than the others.

At first sight it might be wondered what this is, Fig. 6, it looks not unlike a butterfly settled upon something, but it is not that at all; what it really represents is the *beginning* of a mighty beech tree, what looks like the butterfly being the deciduous or cotyledonary leaves with the *root* on the right penetrating the ground, and the *stem* on the left growing upwards and bearing the true and permanent leaves so well

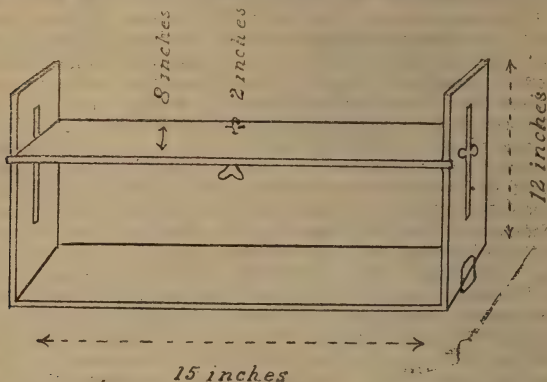
known in connection with this tree (the fig. is placed longitudinally for convenience). Many similar examples may be found in our woods and hedgerows ; in fact, I have photographs of a large number besides those illustrated in this paper, but anyone at all interested can obtain an abundance everywhere. I must acknowledge my indebtedness to Mr. E. M. Holmes, for hints on the entomology of the subject. In conclusion, I think I may fairly claim that by this process more truthful illustrations can be obtained of all these objects than would be possible by the ordinary photographic process.

ENLARGERS.

BY LIEUT.-COLONEL C. GARDNER VATCHER.

Now that hand cameras have come to stay, most people using them wish for something larger than the minute pictures their cameras give. The question will arise what to use by means of which to get a larger picture. Lantern slides are very nice, but you cannot put them about a room. Of course it largely depends on one's pocket. If one is handy with tools, I have seen an enlarger made of two boxes, sliding the one in the other, the negative being fixed in an easel and no light allowed to pass except through the negative, the illumination being by means of magnesium wire, focussing being done by daylight and the boxes clamped to prevent their position being shifted till night. In this case the paper was pinned against the removable bottom of one box, and the lens screwed into the end of the other ; a focussing screen true to register could be placed at the removable end of the box. The measures, as far as I can remember, were $\frac{1}{2}$ -inch wood, the outer box being 18 inches long, 15 inches wide, and 18 inches deep, the other box being about the same length, but sliding easily in the other, for 15×12 enlargements and under. This was a rough and ready affair, but the results were splendid. There are several fixed focus enlargers in the market, all of which are more or less successful, but only enlarge one size, to the size they are bought for, and as a rule there are no means given for adjusting the picture if wanting to enlarge only part of the negative. These are for daylight principally. Another type is Lancaster's "Multum-in-Parvo," which is cheap and most useful, as with it any size negative can be enlarged or reduced, of course to the limit of its size enlarger. It is the type of the sort I advocate, as the fine focussing can be done on the tripod camera which is used with it. Most handbooks on photography recommend, and professionals also enlarge, by means of an ordinary or other suitable camera being fixed in a window in such a way that no light save that passing through the negative, which is placed in a suitable carrier in the place of the focussing screen. The image passing through the lens is enlarged on an easel to which the bromide paper is pinned ; a suitable reflector is also placed at an angle of 45 degrees outside the window, which should be that of a north room by preference. Few amateurs, however, can devote a room to the purpose. The results of this method are better than any of the foregoing daylight methods, as any size enlargements can be made, and masking, vignetting, or adjusting the picture can easily be done. The

only necessary expense, beyond fitting up the window and room so as to exclude extraneous light, is for an easel larger than the largest picture one is likely to enlarge to, and a yellow glass cap for one's lens, which may be a rapid rectilinear or portrait of suitable focus. Those who cannot work by day owing to their business engagements have to fall back on optical lanterns specially made for enlarging. The prime cost is heavy. It is not possible to enlarge any size negative in its entirety beyond that for which it is purchased, though parts of a larger size negative can be enlarged. It can enlarge to any size; adjustments can be made; vignetting, masking, etc., etc., are most easily made with it; it has a constantly fixed light, so exposures are more certain. I use an "Optimus" cantilever with a duplex oil lamp; it is cheap in use, and exposures with my developer are not longer than five minutes—less as a rule. One caution should always be observed if purchasing one for $\frac{1}{4}$ -plates, the condenser should not be less than $5\frac{1}{2}$ inches in diameter, or longer than the diagonal of the negative, and for $\frac{1}{2}$ -plate not less than $8\frac{1}{2}$ inches. Some advise a 6-inch condenser for $\frac{1}{4}$ and a



9-inch for $\frac{1}{2}$, but I find mine works well. If purchasing an oblong condenser for $\frac{1}{4}$ -plate size, it must not be less than 5×4 , as the one for $\frac{1}{4}$ -plate does not cover properly, the appearance of the picture on the easel being barrel-shaped, so there is not much advantage in getting an oblong condenser. Messrs. Lancaster and Son have just made a daylight enlarger for me somewhat different to the "Multum in Parvo" they advertise, in that it has a rising, falling, cross, and reversible front panel, and the front as well as the back can be clamped to any part of my rails. One thing they do not supply with the camera is the stand for one's own camera. The following I have owned for years, and use it when copying, or taking photos of flowers, etc. It is composed of three boards $\frac{1}{2}$ -inch thick, 6 inches wide, the base board being 15 inches long, and the two others about 12 inches long, are nailed at right angles to the ends of the baseboard. These have a $\frac{1}{4}$ -inch slot out central to within 2 inches of the top and bottom, and a long bolt with a round

head at one end and a washer with a butterfly nut at the other works up and down in this slot. A $\frac{1}{2}$ -inch shelf 15 inches long and 8 inches wide completes the stand. This shelf is notched central at the ends leaving an inch at each outer edge so as to fit against the slotted uprights. This serves to keep the shelf level and in position. A hole is bored in the centre of the length, but 3 inches from one edge, and the usual plate screwed over the bottom of the hole for the tripod screw. To attach the stand to the rails the usual clamping wire with nuts is used.

The formula I prefer for developing bromides or lantern slides is as follows:—(1) Sulphite of soda, 1 oz.; water, 10 oz.; sulph. acid, 1 dr.; metol, 50 grs.; (2) Sulph. soda, 1 oz.; water, 10 oz.; sulph. acid, 1 dr.; Quinol, $\frac{1}{2}$ oz.; (3) Carb. pot., 1 oz.; carb. sod., 2 oz.; water, 10 oz.; and (4) a 10 per cent. solution of brom. pot. Dissolve in the order given.

Normal developer: take 240 minims of No. 1, 160 minims of No. 2, 1 oz. of No. 3, and 20 minims of No. 4, to 8 oz. of water, for a 10×8 enlargement. The used developer I bottle up; it remains clear for a long time, and instead of adding the brom. pot., I fill up with old developer. The old developer is useful for developing snapshots.

THE EDINOL DEVELOPER—ABOLISHMENT OF THE COMBINED TONING AND FIXING BATH.

By R. JAHR.

IN my last year's contribution (unhappily sent off too late for insertion in the ALMANAC) I gave some particulars about a new developer, "Paramol." This name has since been changed to "Edinol." I am glad to be able now to report that this developer has proven to be a very valuable addition to our existing stock of developers. It is to be had either in substance or in concentrated stock solutions, containing carbonate of potash or caustic potash, as alkali. Both stock solutions keep well, and bid fair to become strong rivals to the "Rodinal" developer, used in such large quantities by amateurs (and professionals, too) on account of its "keeping" quality, its great concentration and the convenience in using it.

The Edinol developer is indeed a universal developer *par excellence*, giving splendid results for negatives for bromide papers and for transparencies. Bromides develop with a fine, pure black tone, and for transparencies I have found a solution made up of 4 grains Edinol, 4 grains potass. metabisulphite, 30 grains potass. carbonate to the ounce of developer, working very quickly, cleanly, and giving a magnificent warm black tone that will suit as well for window transparencies as for stereoscopic views and for lantern slides.

This time I should like to direct the attention of this ALMANAC's readers to a simplification in the treatment of P.O.P. It is nothing less than the abolishment of the combined toning and fixing bath that I want to write of. The great and general success of the emulsion printing out papers is, in a great measure, due to the simplicity and ease in manipulating those papers, and the main drawback to the combined bath method for the amateur is to be found (besides the alleged non-keeping of the

prints treated in this way) in the danger of surface toning when the bath is nearly exhausted, and in the circumstance that the baths will not keep very long in good order. This gives trouble, especially to those amateurs who only now and then have a print to tone.

All this is changed now if we take advantage of an invention recently made by Dr. Kerckhof, Manufacturing Chemist at the Chemische Fabrik Helfenberg A.G. vorm Eugen Dieterich at Helfenberg, Saxony :

A good-quality, stout filter paper is impregnated with a rather concentrated combined toning and fixing bath, made up after a reliable formula. The paper is dried, cut up, and sold in packages of standard size (for the Continent, 9 by 12 cm. and 13 by 18 cm., for example).

A print having been made on any favourite P.O.P. (collodion or gelatine), a piece of this new paper, corresponding in size, is taken, put together with a sufficient quantity of water in a suitable-sized dish (for 9 by 12 cm. 1oz. of water will do), and the print is now put face up in the dish, and is left therein till the desired tone is obtained, rocking the dish now and then, as usual in toning. The time this operation requires depends upon the negative and the printing paper chosen, and will vary from ten to fifteen minutes. The tones range from a pleasing brown to a rich purple black. The *rationale* of the process is very simple. The salts imbedded in the filter paper, presenting such a large surface, dissolve almost immediately on the addition of the water, and the amateur actually has a freshly made-up combined bath for every print to be treated. The amount of gold chloride (and hypo, of course) in the new paper is sufficient for the toning and fixing of a second or even a third print in the same quantity of liquid. As many as six prints have been toned and fixed in the solution made up from one piece of toning and fixing paper, but this economy is not to be recommended. Double tones have not been observed up to now when using this new combined toning and fixing paper. The new paper is manufactured by and to be obtained from the above-named firm at Helfenberg.

HOW TO DEVELOP FAINTLY PRINTED PRINTS UPON GELATINO-CHLORIDE PAPERS.

By J. T. HACKETT.

AFTER making many experiments last winter, in order to discover a reliable method of developing faintly printed P.O.P. prints *without staining them*, I came to the conclusion that the following formula and method of working came as near perfection as could be wished.

The brands of paper I have experimented with most were Kodak's "Solio" P.O.P., "Paget Prize" P.O.P., and "Marion's Mariona" P.O.P., all of which yielded good results in my hands. But I believe that it will be possible to develop P.O.P. of any brand by following the directions given ; provided it is rich in silver chloride, or the chloride of silver water with which the developer is mixed is strong enough in chloride of silver.

The stronger the water employed for mixing the developer with is in chloride of silver, the more rapid the development will be. The chloride of silver water should be nearly, if not quite, *as opaque as new milk* before

being mixed with the concentrated developer; it will then develop quickly.

As the winter, with its dark weather for printing, will soon be upon us, I thought that an article upon this subject would be acceptable to many of the thousands of readers of this popular Annual, who still like P.O.P. prints.

In order to ensure success, *distilled water* (or water purified by being boiled, and filtered before use) should be employed for all the solutions, and the various washings up to and including toning the prints, after which the water from the main, well, or butt, usually used with success, when printed out pictures are being finished, may be employed instead. Pure distilled water is, of course, the safest and the best to use, and a very convenient way of buying it is, perhaps, in the solid state, *i.e.*, ice. The kind of ice I refer to is that which is guaranteed to be made from pure distilled water. There is a company in Southend-on-Sea (and probably also in other large towns) that supply ice of this description at a cheap rate.

For convenience of reference I have arranged (as far as possible) each operation, and solution used, under their respective headings.

(1.) *The Paper*.—The packets of paper containing the cut sizes are the most convenient to buy and use for this method of printing, because they are more likely to contain fresher paper than the tubes of paper sometimes do; especially is this the case when it has to be bought in villages or small towns, as the sale of the former is likely to be much larger than the latter. And the paper being packed flat is much more handy to use, or to cut to a smaller size, than if cut up from rolls of paper by the photographer himself. The slight extra cost of the packets of paper is made up in other ways.

(2.) *Printing*.—The printing need not take more than from one tenth to one-twentieth (and often less) as long as printing right out would take. Print until the image shows faint detail in all but the highest lights, as much time is thus saved in printing, and over-development is more easily avoided. Deeper printing than the above is quite unnecessary, but it can be carried on much further if desired.

(3.) *Artificial Light*.—It will be safer to fill the printing frames and to inspect the progress of the printing by *artificial light*, a *candle* or *paraffin lamp* being the best to use; although it can be done (with care) by very subdued daylight. *But the development must never be attempted in a light of greater actinic power than that indicated above, or fogged and stained prints are sure to be produced.*

(4.) *Chloride of Silver Water*.—As previously mentioned, it is necessary to mix the developer with chloride of silver water, otherwise development of the faintly printed image cannot take place. The chloride of silver water should be made by artificial light in the following manner. The untrimmed prints to be developed are soaked for thirty minutes or longer in *distilled or other purified water* (moving them about all the time, as in toning), so as to extract all the chloride of silver from them that is possible; then pour this water off into a clean Winchester quart bottle, or some large glass receptacle, and apply a similar quantity of clean purified water to the prints, and proceed as indicated above.

so as to extract as much more silver chloride from them as you can, and pour this into a clean bottle of similar size to the first one named ; label the first bottle A, and the second bottle B, writing under each letter *Chloride of Silver Water* for developing P.O.P. prints. They must both be protected from actinic light by pasting brown or other non-actinic paper round them up to their necks (unless the bottles are made of non-actinic glass), and by keeping them in the dark room, in order to protect their contents from actinic light as much as possible ; *otherwise it may cause the pictures to be fogged or stained during development.* As a guide, I may say that 8 oz. of water will be a suitable quantity for washing the chloride of silver out of two prints $8\frac{1}{2}$ by $6\frac{1}{2}$ in., four $6\frac{1}{2}$ by $4\frac{3}{4}$ in., or eight prints 5 by 4 in. or $4\frac{1}{4}$ by $3\frac{1}{4}$ in., if used in dishes suitable for the size of the prints to be washed, but the smaller the quantity of water it is possible to use, the better, because it will then be stronger in chloride of silver, which will be a great advantage, because it is to be used to dilute the concentrated developer with, and the more chloride of silver there is in it, the quicker it will develop. It is a good plan to wash any printed out prints with as much care as to the quantity of water employed, as if they were going to be developed ; the chloride of silver water thus obtained is to be kept in a clean bottle, to use for mixing the developer with, for developing the faintly printed prints with. Pour the first wash water into the bottle labelled A, and the second wash water into the bottle labelled B. In fact, if printed out prints are trimmed before toning (as they should be, in order to save waste of gold), and the trimmings added to bottle B, the chloride of silver they contain will help to strengthen it in the latter. After the bottles have been standing for some days, most of the chloride of silver will have settled somewhat, and is consequently much more concentrated near the bottom of the bottle ; so about one-third of the water it contains can be carefully poured off and put into the residue tub, or thrown away. By this means a much more concentrated solution (if it can be called a solution) of chloride of silver is obtained than would be otherwise possible. When required for mixing the developer with, the bottle is well shaken, so as to equalise the strength of the contents as much as possible, and then the necessary quantity is poured into a clean glass measure ; it is then poured into a clean glass dish, or a white celluloid, or porcelain, or other suitable developing dish (I much prefer the former, because I find that the chloride of silver the developer contains acts upon the glaze of the porcelain, causing it to crack, and stains them, and the latter in turn often stain the prints during development). Then pour the required quantity of the concentrated developer into the glass measure, and then pour the chloride of silver water from the developing dish into the glass measure, and then return the mixture to the developing dish, and the developer is ready for use. This way of mixing the developer produces a clearer solution than the reverse way of mixing it would have done. *But before developing the prints they must be immersed in an acid bath and well washed (see below, paragraph No. 5).* After the prints to be developed have had the bulk of the chloride of silver extracted from them as described above, *they are well, but quickly washed in four to six changes of clean pure water ;* all of which can be kept in clean bottles for future use, as first and second wash-waters for other batches of prints. By

this method of working there is no waste of distilled or other purified water.

(5.) *Acid Bath*.—The prints that are to be developed are now soaked in an acid bath, or a combined acid, salt, and alum bath, in order to thoroughly clean the prints of all the stain or fog-producing substances that they contain; *thus preventing them from being stained during development*. But if they should sometimes get slightly stained during unusually long development, it (the stain) is generally invisible after the pictures have been fixed and washed; but if a slight stain should still remain, the cyanide of potassium bath, given further on, will remove it.

For convenience of working, mix up one or the other of the three concentrated solutions given below:—

D.		E.		F.	
	Ozs.		Ozs.		Ozs.
Water	18	Water	18	Water	18
Hydrochloric Acid—		Chloride of Sodium..	2	Chloride of Sodium..	2
pure	2	Hydrochloric Acid—		Potash Alum	2
		pure	2	Hydrochloric Acid—	
				pure	2
For use, take of D, E, or F				$\frac{1}{2}$ oz.	
Water (pure)				6 to 8 oz.	

If the weather is hot, or the film of the P.O.P. tends to soften, blister or frill in the acid bath made from the D solution; try using 10 or 12 oz. of water (or even more), instead of the 6 to 8 oz. given, or make the bath from the E or F solution instead, which should prevent any possible chance of frilling, &c. Soak the well washed faintly printed prints from five to twenty minutes in the above diluted acid bath (but ten minutes is generally quite long enough), moving them about, as in toning, the whole time, so as to enable the solution to act on all parts of them thoroughly. The solution is now poured off and thrown away, and the prints washed in at least four waters, so as to free them from the acid, salt, and alum, and from any soluble impurities they may contain. They are now ready to be developed.

(6) *Developers and Developing*.—I have had more success at present with acid developers than with either neutral or alkaline developers, and found the two following concentrated developers work well, when diluted with chloride of silver water to the necessary extent:—

Concentrated Acid Hydrokinone Developer.

Water (distilled)	6 oz.
Gum arabic (powdered)	60 gr.
Citric acid	30 gr.
Acetate of soda	$\frac{1}{2}$ to 1 oz.
Hydrokinone	60 gr.

First dissolve the gum arabic in 2 oz. of hot distilled water, then add 4 oz. of cold distilled water, and then dissolve the citric acid and the other chemicals in the order given.

The above solution *works best when freshly mixed*, but if not more than eight days old it will (when diluted as directed below) produce a developer that does not stain the film or the paper of the print, but stains very badly if it is much older. The above developer works well

without the gum arabic, but if the latter is present it usually renders staining almost impossible, but if the prints should be slightly stained, the presence of the gum arabic in the developer renders it much easier to wash it out during the other operations than if gum arabic had not been used. More or less gum arabic than is indicated in either developer can be used if found necessary. If thought convenient, the above concentrated solution could be mixed up in larger quantities than indicated, *but without the hydrokinone*, which could be added dry, just before use, in which case it would keep in good working order for at least one month probably. I do not advise more than four prints to be developed at the same time until the worker has had considerable practice. The *temperature of the room* in which development takes place should not be under 60 deg. F., and need not be higher than 70 deg. F. If it is much below 60 deg. F. the development is likely to take a long time, and this tends to produce stained prints. But any time up to two hours inclusive should produce stainless prints, but from four to fifteen minutes is about the time it usually takes to develop with the acid hydrokinone developer when freshly mixed, but acid ortol and some other developers may develop more quickly. When a very quick acting developer is employed, not more than two prints should be developed at the same time, otherwise a great many will be spoiled through being over-developed.

To develop two prints, $8\frac{1}{2}$ in. by $6\frac{1}{2}$ in., or four prints, $6\frac{1}{2}$ in. by $4\frac{3}{4}$ in., or eight prints, 5 in. by 4 in., or $4\frac{1}{4}$ in. by $3\frac{1}{4}$ in., 12 oz. of developer should be ample, and possibly more could be developed in it than is stated, but the last few prints will take much longer to develop than the first prints did. A whole plate or 10 in. by 8 in. dish will be a suitable size to use for 12 oz. of developer.

To develop, take :—

Concentrated acid hydrokinone developer	..	1 to 2 oz.
Chloride of silver water	..	10 oz.

When freshly mixed, it will develop in fifteen minutes or less, without staining the film or the paper of the print.

Concentrated Acid Ortol Developer.

Water (distilled)	..	6 oz.
Gum arabic (powdered)	..	90 gr.
Metabisulphite of potash	..	30 gr.
Ortol (Hauff's)	..	90 gr.

Mix in the same manner as indicated for the hydrokinone developer. The above developer also works much cleaner when freshly mixed.

To develop, take :—

Concentrated acid ortol developer	..	1 to 2 dr.
Chloride of silver water	..	6 oz.

At least one print, $8\frac{1}{2}$ in. by $6\frac{1}{2}$ in.; two prints, $6\frac{1}{2}$ in. by $4\frac{3}{4}$ in.; or four prints, 5 in. by 4 in. or $4\frac{1}{4}$ in. by $3\frac{1}{4}$ in., can be developed in the above quantity of developer. The development takes place very quickly, the average time being from three to ten minutes. The strength of the developer (and the time it is allowed to act) must be varied to obtain the amount of contrast desired in the prints. Prints from thin flat negatives

may require stronger developers than those given, *in order to increase their contrasts*. For which the following developers may be tried :—

Concentrated acid hydrokinone developer	.. 2 oz.
Chloride of silver water	.. 6 to 8 oz.

or

Concentrated acid ortol developer	.. 2 dr.
Chloride of silver water	.. 6 oz.

But prints from negatives having excessive contrasts, it will be better to develop them with a weaker developer, *so as to reduce their contrasts*, for which one of the following developers may give the desired results :—

Concentrated acid hydrokinone developer	.. 1 oz.
Chloride of silver water	.. 5 to 6 oz.

or

Concentrated acid ortol developer	.. 1 dr.
Chloride of silver water	.. 6 oz.

Of course, the foregoing developers are only intended as a guide, and each worker must vary their strength until he obtains the effects he desires in his prints. Care must be taken not to over develop, and for this reason it is best to work with rather weak than strong developers, as they act slower, and are consequently more under control. *The speed of development and the density is affected more by the quantity of chloride of silver that is present in the developer than by the quantity of the developing agent it contains.* In fact, *the chloride of silver* in the developer *is the accelerator* in the foregoing acid developers (for development cannot, and will not, take place without it is present in sufficient quantity), while the citric acid and acetate of soda (or metabisulphite of potash, as the case may be) act as restrainers of fog, while the gum arabic or fish glue (*i.e.*, isinglass), when present, act as stain preventors and restrainers as well.

When the development is completed, wash the prints as rapidly as possible in at least two to four clean waters, and then immerse them for from five to ten minutes or longer in the following bath :—

Take of the concentrated "D," "E," or "F"	
solution	.. ½ oz.
Water (pure)	.. 6 to 8 oz.

The prints are moved about (as in toning) all the time they are in this bath ; the object of which is to remove, or destroy, the last traces of the developer, as well as any slight stains there may be ; after which they must be well washed in clean water, in order to free them from acid and any soluble impurities the film or paper may contain. They are now ready for toning, and if the developer, acid, etc., has been thoroughly removed from them, they will tone as quickly and as well as if they had been printed out and treated in the ordinary way.

Any of the toning baths usually employed for P.O.P. should work well but I have used the following formula with great success for the last four or five years at least, for both printed out and developed P.O.P. prints :

I copied the formula from the *Photographic News* of September 25th, 1896, page 620, viz.,:—

Stock Solution.

Sodium acetate	.. .. .	1 oz.
Sodium bicarbonate	.. .. .	1 dr.
Water. (distilled)	.. .. .	15 oz.

The above keeps in good working order for at least twelve months.

To make the toning bath take.—1 oz. of the stock solution, 8 oz. of distilled water, and 1 gr. of chloride of gold. After toning well wash as usual, and fix for fifteen minutes in hyposulphite of soda, 2 oz. to 4 oz. ; water, 20 oz. I use the latter strength unless it causes frilling, in which case I use it weaker as indicated. Well wash as usual after fixing.

If any of the prints are stained slightly, or require reducing, the following solution will do it:—

Cyanide of potassium	.. .. .	6 gr.
10% solution of liquid ammonia	.. .. .	1 dr.
Water (distilled)	.. .. .	20 oz.

The stains, if any, will disappear in about five minutes, and slight reduction may take place also, but a much longer immersion than this will be necessary if very much reduction is required. If distilled or purified water is not used for all the foregoing solutions, and for all the different washings up to toning, success need not be expected, as I have found that when the prints get stained, the cause is usually to be traced to some impurity contained in the water employed for mixing the solutions or for washing the prints with. Unless some mistake has been made in mixing or using one or more of the solutions employed impure water is usually the cause of failure, but non-success may be due to insufficient washing before or after developing, or both.

A USEFUL GAS STANDARD FOR COPYING.

By W. P. WISEMAN.

IN the ALMANAC for 1897 I had the pleasure of describing my copying frame, and now, in response to the Editor's request for something practical, I am venturing to explain how I have constructed at small cost a lighting arrangement for use with the frame. Living in the country until recently, the only artificial light available to me has been magnesium ribbon, but having now access to gas I find the incandescent light much more convenient and equally efficient. It being essential that the light should be capable of being placed in any position in regard to the subject being copied, I determined to utilise a couple of moveable standard lights. These I found on enquiry would cost me, if of sufficiently solid construction, about half a guinea each. I propose to show how both may be obtained for much less than that, inclusive of the incandescent burners, glasses, and mantles. For a single standard procure from the ironmonger a $\frac{3}{4}$ iron flange, a $\frac{3}{4}$ T-piece, about 12 inches of $\frac{3}{4}$ iron tube threaded at each end, a gas cock with straight fitting, a rubber tube connector and two nipples, also a large size wooden gas block (mine is 7 inches in diameter), and incandescent burner, etc.,

complete. The cost of the whole of the above should not exceed 4s. To fit up, connect the flange and T-piece by means of a nipple, then screw into the upper end of T-piece the length of tubing, to the other end of which attach the gas cock, straight-fitting, and burner. Into the outlet of the T-piece screw the connector by means of a nipple. After plugging up the hole at the back of the flange, screw the whole arrangement to the wooden block. A piece of rubber tube to connect with the nearest gas bracket completes the arrangement, which will be found of great use in many ways besides that for which it has been made. For copying engravings and such like, a single light placed beside the camera will suffice; but when a shiny surface has to be dealt with, to avoid reflections, two lights, placed at an angle of about 30 deg. with the surface of the picture, should be used. Reflectors of white cardboard, bent into a semi-circular shape, and placed behind the lights, serve, not only to increase the illumination, but also as a protection to the lens from direct rays.

[THE TELEPHOTO LENS]

By PROCELIA.

THIS lens is certainly a valuable aid to distant landscape photographers. Except in one respect, however, such good results cannot be got by a combination of a positive and a negative lens as those obtained by the single view lens. The exception is this—that the telephoto lens has a power of rendering objects at varying distances in focus which the single landscape lens does not possess. Dr. Rudolph, of Jena, in his monograph on the telephoto lens states that perfect correction of the lens can only be made for each particular combination used, and for a definite length of camera. When the negative lens is used with a positive one for which it has not been specially constructed, and with a varying length of camera, the defining power is lessened. It seems to be the opinion both of makers and users that the negative lens should have a focal length of about a half or third of that of the positive one. One of the difficulties in the wider use of this lens is, undoubtedly, the high prices charged for the negative lens. Many photographers would no doubt use such a combination if they knew how a very simple one could be had at a trifling expense. I have had two of the negative lenses, both by Zeiss, which are not now in my possession. Some time ago I wished to photograph some distant shipping when temporarily staying at the seaside, and finding I had a negative "Barlow" lens, made by Mr. Wray for me long before he began to make photographic lenses, I adapted it to a 10-inch landscape lens by him. The "Barlow" was screwed into the end of a tube which was made to take the camera flange, while the positive lens screwed into a tube which moved by friction on the outside of the tube carrying the negative one. The mount with a 10-inch length of camera is just 6 inches long. I found with this combination I got exceedingly crisp and sharp negatives on a quarter-plate, both near and distant objects being beautifully rendered. The sign boards in the middle distance had letters on them which were as distinct as if printed in a book. A negative "Barlow"

costs 15s., and it can be combined with any R.R. or view lens a photographer may have, having a focal length of not less than 8 inches. An achromatic "Barlow" lens of this kind is not even necessary. In "Popular Astronomy" for 1891 there is reproduced a paper by Professor Barnard, of the Lick Observatory, now of the Yerkes Observatory, which originally appeared in the *Chicago Beacon*, a paper which was originally started by Dr. John Nicol, formerly of Edinburgh, and who was one of the original members of the Edinburgh Photographic Society. Professor Barnard was five years in a photographic studio in one of the Southern States, and is one, now, of the very ablest of our stellar photographic astronomers. In this paper he says he took a Laverne R.R., a half-plate lens, and combined it with a spectacle lens of two inches negative focus, giving with the length of camera he used a magnification of about seven times. A photograph is reproduced to illustrate his paper of a view of Mount Huyghens, taken with the R.R. alone, and another, taken with the combination, of the water fountain on the mount which supplies the observatory with water, the fountain being included in the first photograph. Both of these are very excellent illustrations of what may be done with such a simple combination. I have myself fitted a spectacle lens of 3 inches negative focus at the one end of the inner of two tubes, my Dallmeyer half-plate R.R. forming the positive. The mount in this case is quite a short one, $4\frac{1}{2}$ inches long, excluding, of course, the length of the R.R. mount. This latter combination gives excellent negatives. It has been used often on a series of roofs of houses from my bedroom window, and the definition of the tiles and slates on these roofs at varying distances is all that can be desired. The cost of one of these negative lenses is only a few pence. A chemically-blackened stop, five-eighths of an inch in diameter, is placed in front of and in contact with the negative lens, while another stop of about half-inch in diameter is placed in the inner tube, also in the negative lens, and from two to three inches in front of it. Experience has shown me that this latter stop is of great practical value in obtaining crisp definition.

PORTRAIT PHOTOGRAPHY FOR AMATEURS.

By J. LEISK.

In response to the Editor's request for a "practical article," it has struck me that a few remarks on the above subject may be of interest to the younger members of the class referred to, even if it should seem like teaching the A B C to the more experienced.

I suppose there are few amongst us who have not at one time or another turned their cameras on the "human form divine" and attempted to take the portraits of their sisters or their cousins or their aunts, not to mention friends of the other sex, and although their efforts at landscape photography may have been quite successful, I am afraid that few can say that they have succeeded equally well with portraits, and that they can turn out work equal to that of the average professional photographer.

If we consider that many amateurs possess as good lenses (and, by the way, a very expensive lens is not a *sine qua non*), can use the same

plates and printing paper as the professional, and that they have the further advantage in the case of either children or grown-up people with whom they are intimate of obtaining an easy, natural pose and expression, the question arises, Why do they not succeed equally well, or better? The answer will, I think, be almost fully expressed in the two words *defective lighting*, and in a supplementary degree by *unsuitable accessories and surroundings*.

It goes without saying that a successful portrait cannot be made in bright sunshine, and if we go round to the shady side of a building it will be evident that the strongest light is coming from the sky overhead, and as the sensitive plate is far more susceptible to different degrees of strength in the light than the human eye, it follows that if a sitter is thus placed in the open and photographed the strong sky light will cause every projecting part of the face to throw a shadow. Eyebrows, cheeks, nose, lips, and chin will each throw their respective shadows more or less, exaggerating the prominent features and by contrast the hollows, and making the least line or wrinkle in the skin appear like a furrow, while the strong light on the top of the head will make the hair look unnaturally light, or appear grey.

The remedy is obvious; but if the portraits have to be taken outside, the operator must choose a suitable spot and be at a little trouble to control the lighting of it.

In the first place, the shady side of a building must be selected, then, as it is desirable to have the light a little stronger on one side of the sitter than the other, a spot near, but not too close to, an angle in the building or the enclosure walls is to be selected where the best light is as unobstructed as possible in front and on *one* side; then some form of shade overhead must be contrived, projecting at least two or three feet towards the front over the sitter, but not too low down so as to throw a dark shadow on his or her head. This may be erected like the outside shades over shop windows, or in a more temporary manner by a sheet spread over suitably placed sticks or stretched lines. A tree with thick foliage and low spreading branches may afford the necessary shade as a makeshift, but it is better to have something one can adjust as to both size and height. The result to be aimed at is to soften the top light, and thereby in proportion to strengthen the front light, so as to avoid the shadows before referred to, and to have the hollows and dimples in the features lighted from the front, and *nearly* as strongly as the more prominent parts, so as to give softness and roundness, while having one side more strongly lighted than the other will give the necessary relief to the portrait as a whole.

A few trials on the lines I have indicated will probably be necessary to insure success.

I need hardly add that if the amateur possesses or has access to a greenhouse or conservatory of sufficient size, the arrangement of light screens, &c., can be very much more easily managed.

Having successfully overcome the major difficulty of the lighting, there is the background and surroundings, or "accessories," to be considered. An otherwise good portrait may be spoiled by an unsuitable background, such, for instance, as the sash bars of a window showing in straight lines behind the sitter's head. A plain plastered or ivy-

covered wall may do fairly well as a background, but a light slate-coloured sheet of some kind will do better, as any markings or pattern on a background detracts from the success of the picture, excepting, of course, suitably painted scenic backgrounds; but those are not likely to be forthcoming in this connection.

Other accessories, such as chairs, tables, books, plants, golf clubs, cricket bats, tennis racquets, &c., must be made to harmonise with the dress and supposed occupation of the sitter at the time; but the arrangement of these must be left to the good taste of the operator.

ON SENSITIVENESS.

By J. BARKER.

THE demand for increased rapidity of gelatine plates is being met by our manufacturers in a commendable manner, but it cannot be said that perfection has yet been attained, and, although we have had plenty of discussion upon the sub-bromide theory, which is, after all, only a partial explanation of the action that takes place upon the impact of light upon a prepared compound, very little information has been afforded of the *rationale* governing the action which takes place in the preparation of a light sensitive compound.

Now, in the sensitive emulsion as ordinarily prepared we have three ingredients, namely, a metallic salt, an haloid salt and organic matter, and it is absolutely necessary that these three ingredients be brought into intimate contact with each other for the perfection of the sensitive compound, and, although the changes may be rung upon the method of mixing the three ingredients, it seems to be preferable for the organic matter to unite at the same time that the metal and haloid are united—that is, when all are in a nascent condition.

The temperature at the time of mixing is also an important factor, although the maximum sensitiveness can be obtained either by mixing the ingredients at a high temperature, which gives the quickest result, or by mixing the same at a low temperature and afterwards applying any desired heat to the compound; and, other things being equal, in proportion to the heat applied will be the time taken by the compound to attain its maximum sensitiveness, and, provided certain precautions are taken, one method answers as well as the other. It will also be found that the purer the ingredients used the better will be the working properties of the compound and the greater its sensitiveness to the action of light, also that gelatine from young animals is much preferable to that from old ones.

As regards the action which takes place in the formation of the light sensitive compound, we may, without wandering into the depths of the origin of matter, illustrate the case briefly by supposing a primary atom with an inherent tendency to group itself into certain molecules which, in their turn, inherit a tendency to form a certain class of radicle which, in its turn, is the parent of our compounds, and this raises a question as to why some atoms group themselves into molecules that form organic compounds and life matter, whilst other atoms group themselves into molecules that form inorganic or lifeless matter, although all obey the

same laws of combination and decomposition. We, however, know that this series of inherited tendencies is either assisted or retarded by the action of light, according to whether the blue or red end of the spectrum is utilised, and it is extremely probable that all intermediary action is caused by the blending of these two rays.

Therefore the essential constituents of a practical light sensitive compound appear to be a metal, an haloid and an organic compound radicle.

CYCLING WITH A CAMERA: A FEW THOUGHTS.

BY H. SELBY.

FOR the past two or three years I have "had my say" in this ALMANAC on the subject of "Hand Cameras." During the past year my experience with regard to these necessities of life has been limited to glueing my nose to dealers' windows and studying catalogues. True, I have been using my old, old Shew Eclipse with Cooke lens, and, true, I have just, at a sacrifice which makes me squirm, exchanged two cameras for a Sanderson Tourist Hand Camera, but I have not yet received the new camera, and consequently cannot pronounce upon its merits. Before turning to my "few thoughts" upon cycling with a camera, I should like to mention an experience which I had with a "Sanderson" in my holiday. I met a motorist at an hotel in Lincolnshire, and, our conversation turning upon photography, he produced his new "Sanderson" for my inspection. He told me how many hours (or days, was it?) he had spent in hunting for all its "points," and he said he was not so sure he had as yet found them all. As I was still on the search for the perfect hand camera, I asked if it had a reversing back, and he said "No." I remarked that that was a pity, as the immense rising front, which was such a feature in the instrument, was therefore confined to horizontal pictures. Suddenly he called out, "By Jove! it has, though!" I have no doubt he is still hunting around for fresh points.

Now, before writing on such a subject as the combination of cycle and camera, it is undoubtedly well to have had some practical experience. The mere theorist is of use up to a certain point, but only that. After a fortnight's experience I have come to the conclusion that the majority of writers whose lucubrations one reads in cycling and photographic papers are mere theorists and nothing more. The question seems to me to resolve itself into very simple *little* things, and the first of these little things is unquestionably the method of fixing the camera to the cycle. I have found the Turner bi-carrier to act perfectly. I have seen the instrument (the camera, I mean) strapped to the front of the cycle, and I have seen it hung on the top bar, where it obstructs the knees in riding. But the bi-carrier seems to me a perfect apparatus for the purpose, except for, perhaps, theoretical reasons, which I am content to ignore. Now, the camera has to be put in a case of some sort, and this is a serious point; but whatever case is employed, it *must* be secured quite fast to the bi-carrier, and not only so, but the camera and whatever else is contained in the case must thoroughly fill the case, so that there is no shaking beyond that which is caused by the vibration of the cycle. To have, as I had once, the camera slides rattling about behind one like a bag of bricks is not only dangerous to the apparatus, but it

is also trying to the nerves. The focussing cloth is a useful piece of apparatus for fixing everything rigidly in the case. Again, as time is usually of consequence, it is well to have the case so arranged that the camera, etc., can be got out without entirely removing the said case. If the latter is not so high that it cannot be opened without being obstructed by the saddle, it is well to have it arranged with the lid uppermost; otherwise it should be laid with the lid pointing backwards.

Now, the *bête noir* of the photo-cyclist is unquestionably dust. Dust has been defined as "dirt in the wrong place," and certainly it is in the wrong place when it is found on the emulsion of the plates, not to mention the bellows and lens and slides. A canvas case certainly admits dust everywhere, and my own idea is that it would be an advantage to have an outer case fitting right over the main one like a lid. As dust easily gets to the under side of the case through the lattice-work of the carrier, a card underneath would appear to be an advantage. It would be a counsel of perfection to recommend carrying camera and slider each in a separate case inside the main case, but this would certainly appear indispensable, at least with regard to slides.

Next, with regard to the tripod. First, as to where to fix it, and that appears to me to be a simple matter. Slung along the top bar seems to me the fittest. Next, as to the form of tripod. The aluminium telescopic form appeals to me from its compactness and ease of erection, though in point of rigidity it leaves much to be desired. (By the way, it will not bear a violent kick, nor does standing on one or more of its legs when extended improve it, as I personally discovered.) I have myself for some considerable time used one of the Kodak stick tripods, which, of course, extends beyond the front of the bicycle. Except for appearance that does not much matter, though in case of turning the machine sharply it may get in the way of the brake plunger. The ordinary three-fold tripod has always seemed to me a fraud. I takes such an unconscionable time to erect it. When photographing, as I did in my holiday, in a church where I was informed that the vicar objected to photographers, it is well to have a tripod that is up in a brace of shakes. Of course, the hand camera man has the advantage, but he must have a tripod for interiors; and if there is a light, rigid tripod, which when folded is of reasonable dimensions, and which can be erected within half a minute, it would be a great boon to photo-cyclists to know of it.

These are the main points in connection with cycling with a camera which have occurred to me. There are no doubt others, such, for instance, as plates *v.* films; but this is a matter that concerns others than cyclists.

Since writing the above I may add that I have recently seen a tripod which appears to me very suitable for the cyclo-camerist. It is supplied by Adams, and is known as the "Perfecto." It is telescopic, made of steel, and each joint is fixed tight by clamping screws. The height, when fully extended, is $55\frac{1}{2}$ inches—a very fair height—and when closed only $20\frac{1}{2}$ inches. The weight is about $1\frac{1}{2}$ lbs. The head is adjustable to any angle without the necessity of moving the legs; and finally, as a matter of supreme importance, its rigidity, all things considered, is surprising.

SOME ERRONEOUS IDEAS ABOUT OLD PROCESSES.

By E. W. FOXLEE.

It has often amused me, as one who has been "through the mill" with all the old processes from the Daguerreotype downward, to note how glibly some modern writers speak about them, and the ignorance they sometimes display in so doing. For example, a few years ago I saw in one of the photographic journals the Daguerreotype, in all seriousness, described by a writer as "a picture taken on a silver plate and intensified with bichloride of mercury." Could anything well be more ridiculous or misleading than that to those desiring information? Briefly, the process is this: A highly-polished silver (on copper) plate is first exposed to the fumes of iodine, then to the fumes of bromine, and again to those of iodine, when it is ready for the camera. After exposure the plate is submitted to the fumes of mercury, contained in a vessel heated by a spirit lamp, which develops the image, when it is ready for fixing with hyposulphite of soda. It is afterwards "gilded" (toned) with gold, "Sel d'Or" being used for the purpose. It will here be seen that the process was an absolutely dry one up to the fixing of the picture. The sensitising of the plate, and the development of the image, was done entirely by fuming.

While referring to Sel d'Or it may be well to refer to a fallacy with regard to it that I have more than once seen promulgated in connection with very old prints that have remained unchanged, namely, that they were toned in the old Sel d'Or bath, when they were really toned in the old combined bath of hyposulphite of soda and gold, the writers evidently not knowing any better. Sel d'Or (salt of gold), it may be mentioned, was but little used for toning paper prints. Its chief employment was for "gilding" Daguerreotypes. It is a double salt of hyposulphite of gold and soda, containing one atom of the former to three of the latter. It used to be put up in fifteen-grain tubes as chloride of gold now is, and its price was from three to four shillings per tube. It is not now an article of commerce. When it was used for paper pictures the toning and fixing were separate operations. The prints were first washed, to remove the free silver, and then toned in the Sel d'Or solution, and afterwards fixed with hyposulphite of soda, as in the method of separate toning and fixing of to-day.

The old Calotype process is often confounded by modern writers with the wax paper process, probably because negatives by the former were usually waxed to render the paper more transparent for printing. I remember when organising the Photographic Section of the Victorian Exhibition at the Crystal Palace (1897), some calotype negatives were received that were described by the lender, into whose possession they had come, as being wax paper ones. The two processes, it may be explained, are quite different. The former is a wet process, sufficiently sensitive to have enabled portraits to be taken, commercially, by it in the studio; while the latter is a dry, and very slow, one, requiring from a quarter of an hour to an hour or more exposure out of doors. In the calotype process the waxing of the paper is the final operation—done after the negative is finished. In the other process it is the very first, even before the paper is iodised. Again, calotype paper, after sensitising, would only keep for a few hours, while the other would keep for many weeks.

The albumen process is frequently confounded with the collodio-albumen process, probably because, in the modern method of working it, a substratum of collodion is generally employed. But the processes are essentially different. In the former the plate is first coated with collodion, washed, and then coated with the iodised albumen, dried, and then sensitised. In the latter process the plate is collodionised, and then sensitised in a silver bath, as if it were for the wet collodion process; it is then washed and the iodised albumen applied, dried, and then again sensitised. In this process the plate is, so to speak, sensitised twice. Collodio-albumen plates are much more sensitive than are those by the original albumen process, which is now only employed for making transparencies.

Here is a fallacy that I have often seen in print, namely, that until the invention of gelatine plates "instantaneous" photography was not possible. But it was, for in the early sixties the late Mr. William England took a series of instantaneous stereoscopic views of the streets of Paris, and at about the same time the late Mr. Valentine Blanchard secured a similar series of the streets of London. These for sharpness and detail were quite equal to any since taken on gelatine plates. In the Exhibition referred to above, was a Daguerreotype of New York harbour, taken about 1850, also, I think, by Mr. England, in which a small steamer had the paddle wheels and the foam from them sharply depicted. Again, in 1851, Fox Talbot, at the Royal Institution, by a modification of the albumen process, took a photograph which for instantaneity has not yet been surpassed. The experiment was this: some printed matter, fixed on the periphery of a rapidly-revolving wheel, was illuminated by the single discharge of a Leyden battery, yet the lettering was sharply defined when the plate was developed. Although instantaneous photographs were taken in the early days they were produced under very great difficulties as compared with the present facilities for obtaining them. Still they were taken, and successfully too.

The gum-bichromate process is looked upon by some as being quite a modern one, while it is really the original carbon process, and was introduced by the late Mr. John Pouncy in 1858—several years before the invention of the present carbon process.

There are other existing fallacies that I could deal with, but I am afraid that the Editor will not allow me the space.

EXCESSES IN PORTRAITURE.

A. V. KENAH.

It is by no means an easy matter to describe what I mean by excesses in portraiture. It is a quantity which one instinctively feels when brought in contact with; it is an evidence of bad taste which requires to be carefully eliminated. Du Piles, an old and highly-esteemed authority on portraiture, exhorts his pupils to add grace and dignity to those whose portraits we draw; but he spoils this good advice by describing what he understands by grace and dignity.

Says he: "If you draw persons of high character and dignity, they ought to be drawn in such an attitude that the portraits must seem to

speak to us for themselves, and, as it were, to say to us, 'Stop, take notice of me; I am that invincible king, surrounded by majesty.' 'I am that valiant commander, who struck terror everywhere;' 'I am that great minister, who knew all the springs of politics;' 'I am that magistrate, of consummate wisdom and probity.'" To some minds this may seem a very good and proper course to pursue, but it does not commend itself to the true artist. It is what I call an excess in portraiture; work done on these lines will always appear to be vulgar, self-assertive, and full of pompous and laboured insolence, which will not in any way create respect for, or give dignity to, the subject of the portrait. Observe the works of Titian; we find in them a natural, unaffected air, where dignity, being natural and inherent, draws spontaneous reverence. These qualities are most certainly required in portraiture, but, I fear, we do not often see them in our photographs.

It is, undeniably, a hard road to travel on, and success therein requires great perseverance with inherent artistic taste. The mind must never allow itself to be led away to pursue easier and more sordid methods, but must always be contemplating the ideal perfection which it is striving to imitate. People speak of their fellow creatures as appealing to them in such and such a way. Exactly so; it is the manifestation of character that we require to reproduce, not the details of bodily adornment. These are very well in their place, but are secondary to the main purpose, and must only be employed as a support and set-off to help us in our task.

It is the artist's duty to be able to ascertain the temperament of his subject; to be able to extract the manifestation of the intellect rather than arouse artificial emotions; to isolate the mind from the imprisonment of the body. Until this is done, our picture will savour of affectedness and artificiality; we shall see our subject as influenced by the emotions we have aroused, or by the circumstances of the immediate environment, and not, as we require to see it, as the personification of the inner self.

Recognising, therefore, the importance of simplicity, we must, nevertheless, be careful not to go to the other extreme and sacrifice everything else to the attainment of this virtue, for our works would then become insipid and inanimate.

This would then become another type of excess, and as disagreeable as any other kind of affectation.

Sir Joshua Reynolds, a man who both knew and practised the philosophy of art, very rightly says:—"Simplicity, when so very inartificial as to seem to evade the difficulties of art, is a very suspicious virtue."

Nowadays, few suffer from this failing; a contrary spirit is for more prevalent; and, if we take the works on view at our exhibitions as any evidence of the trend of thought of our portraitists, it must be admitted that, in many quarters, the doctrines of the iconoclast have unfortunately been assimilated. This, indeed, is a worse form of excess than its antithesis; novelty, contrast, and variety are all excellent virtues, and, moreover, dispositions actually existing in our minds. Variety arouses us when we become apathetic from continued sameness; contrasts arouse the power of comparison by opposition, and novelty impresses us more strongly than does the representation of what we have seen before.

But against these characteristics we have to place another very real one—our inborn disposition to indolence. We do not relish our minds being too actively exercised, although a certain amount of it is distinctly stimulating. All of us have inherited tastes, and we experience pleasure from our old habits and customs; and when novelty crushes these we do not gain any advantage from it, but, on the contrary, are displeased with it. We become more tolerant as we advance in wisdom, recognising that our knowledge is, at the best, incomplete; we cease to display microscopic sections of our prowess, preferring the contemplation of the unity of the whole.

It is by reaping the thoughts of others that we learn to think; therefore continued contemplation of the works of masters cannot but act beneficially to us. By studying our predecessors we shorten our labours by gaining the result of the selections more learned men than ourselves have made. Mere admiration, though, will not help us; we must seek to discover the principles on which the work was wrought. When we are conscious of some work affecting us strongly, the cause of that effect will invariably be, not on the surface, but hidden away somewhere or other.

Imitation alone will never carry us far, but, presupposing individuality of mind in the student, storing our minds with the wisdom of the masters will inevitably result in the development of our own embryonic ideas.

We must be careful, though, in our selection of those we seek to imitate; Cicero, in his dialogue on Oratory, makes Crassus say, “*Hoc sit primum in præceptis meis, ut demonstremus quem imitemur.*”

I would commend this advice to all students of art, as being of fundamental importance to them. There are no minds so rich that they cannot benefit by the wisdom of others; only, be sure that you are assimilating wisdom and not hypocrisy. If the student finds that this study of masterpieces merely acts as an incumbrance to him it can only be because his mind is too feeble for the task he has set himself; and, unfortunately, it would seem that there are a very large number of professional photographic portraitists who must suffer from this defect, for otherwise why do they turn out such inartistic work?

FURTHER EXPERIENCE WITH GLYCIN.

By WILLIAM BROOKS.

DURING the past year I have made “glycin” as a developer a special study. The numerous letters I have received since my short article appeared in last year’s *BRITISH JOURNAL PHOTOGRAPHIC ALMANAC* shows plainly that considerable interest is taken in the matter; therefore I give my further experience on the subject. For some time I thought it, like pyrogallie acid, soon deteriorated by exposure to the air in the concentrated form as well as diluted. From experience, I find this is not the case. Purposely I have left diluted solution after use in a developing measure for three or four days, not even covered over, without it losing its developing properties. Last year I mentioned that it had better be put up in one-ounce bottles full to the cork (*i.e.*, the concentrated solution). This system I have abandoned, as I find it is

not required ; so make it up in large bottles and use therefrom in the ordinary way, diluting as required. I have used it very extensively since last year for both small and large negatives, also for photo-micro work, and as an all-round developer it is unsurpassed. Some seem to think it is slow in its action. I do not find it so. As a rule many seem to want to rush things out about a gross in an hour. The point I consider is quality of production, and not quantity. The great charm of glycin is the beautiful gradation that it gives. A developer that rushes the image out all at once gives extreme flatness, and very poor in quality. The price of glycin, compared with pyro, is double ; but it will do quite double the work, and more. In working for a normal developer I dilute one part of the concentrated with three of water ; this acts fairly rapid. Several plates can be developed in this, and after a time a little fresh added to it. I do not throw the used developer away when I have finished, but put it into a bottle for further use. With a slow gelatine plate and a dilute developer I get the most perfect transparencies for enlarged negatives. When I say diluted I mean, say, one part of concentrated to ten parts water. If a restrainer is required I use a drop or two of a 10 per cent. solution of potassium bromide ; this must be used with caution, as it acts more readily than it does with pyro or other developers. The dilute solutions for transparencies give a warm brown tone, just suitable for making enlargements from, and the gradations are well preserved. As diluted solutions take some time to act, I have either a large tray containing several plates or several small ones to the size of the plates, so that time need not be lost. One thing must be observed, and that is, not a trace of hypo must be about the fingers, or the plate when finished is of a bright yellow colour ; but should this accidentally occur, this yellowness can be removed when the negative is perfectly dry by rubbing it with a soft piece of rag wetted with methylated alcohol. I always make it a practice to clean all negatives before printing in this way, to remove spots and grit that the soft gelatine film takes up from the water.

The plan I adopt now in making up this developer is to make up the whole ounce bottle of glycin at once. I take a thin glass flask that will stand heat, and put in the water first and bring to just below boiling point before I add the other ingredients thus :—Hot water, $17\frac{1}{2}$ ozs. ; soda sulphite, 1,100 grs. ; pot. carb. 2,275 grs. ; glycin, 1 oz. (bottle). Add in the order given. This when finished will be a little over twenty fluid ounces. I forgot to mention that the glycin must be added a little at a time on account of the effervescence that takes place. When quite cold I generally filter it.

TWO SUGGESTIONS.

BY THE REV. J. J. S. BIRD, B.A.

EVERY practical detail of photographic practice has been so thoroughly sifted out by its many and accomplished votaries that it is difficult to take up a subject profitably. For a man merely to air his own opinions is not to teach others, but to gratify himself.

But there are two suggestions which my experience in the past makes

me think would be of value. The one will apply almost universally, the other to most earnest workers.

We all know the labour and money, care and ingenuity, expended by dry plate manufacturers in their endeavours to produce a perfect plate—in which they seem to have admirably succeeded to a certain extent. There is one point in which they fail—they cannot produce plates that will keep. And it is astonishing how great a difference there is in the keeping properties of different makes of plates. Some brands will keep for half a dozen years, while one prominent brand I sometimes use cannot be depended on after six weeks. Even the different makes of the same firm are not equally dependable. Paget XXX and XXXXX seem to keep all but indefinitely, but Paget Extra Rapid are almost worthless after six months. Hence a person buying by chance stale plates will have nothing but failures, and will consign the makers to an unknown oblivion, when really the fault does not lie directly at their door. The plates were perfect when sent out, but worthless when they left the dealer's shop. It is not likely a dealer will go and cry "stinking fish" by saying the plates are old—it would be ruin. The only thing to give confidence to workers is that all boxes of plates should be plainly marked with their date, and returnable after a certain time if not then used.

In the interest of their own reputation, respectable manufacturers should put the date of manufacture on each box of plates and on every package of paper, or state (like it is on certain makes of films) that the contents will not be guaranteed after a certain date. Such a course might involve some amount of loss, as old stock would have to be taken off a dealer's hands, but it would be a gain in the end, as it would impart confidence in the brand of plates and in the maker's reputation. This is a very real evil. Being in a country town last year, I bought some plates of a local dealer, every one of which was bad. And what wonder! for when I sent to the makers and forwarded the batch number I found that those plates had for nine years been exposed to the unhealthy influences of a general shop.

Another point in which makers might assist photographers would be to paste all working instructions on the outside of the box or packet of paper. I am aware that some do so, but the plan should be universal. This failing is especially noticeable in bromide papers, and particularly in the German goods, which are so much vaunted. Instead of printing directions on the bottles of their "patent" developers, the labels are covered with the pains and penalties which are consequent on using "Ortol" or "Glycin," etc., after the bottles are empty. Even the name of the contents is inscribed in the most insignificant type.

One other suggestion I would urge upon my brother amateurs and others who love photography for its own sake as being most helpful and interesting. When Wall's "Dictionary of Photography" was first published I had a copy interleaved with the thin paper which is used for typewriters. Being a reader of all the principal photographic journals, I week by week followed the development of the art-science, and but few weeks passed without some fresh light being shed on the subject—new developers, new methods, and the weeding out of effete ideas. I entered the cream in my common-place book under the respective

headings, often condensing whole pages into a few words. I have now the whole wisdom and experience—at least, all that is of any good—in one handy volume. Had I known in time that the publishers were bringing out a new edition of this dictionary I should have offered the editor the use of my work, which is practically ready for the press. I hope soon to have the opportunity of comparing the two.

It may be only a few who have the time or opportunity of carrying out my idea. But short articles descriptive of the working of new developers can be cut out with very little trouble and pasted by one thin edge opposite the subject. And anyone of ordinary ingenuity might develop the plan according to his own idea. For those who cannot afford a dictionary a shilling manuscript will make a very good substitute. For lengthy articles of interest I tear out the whole pages of the magazines and bind them together.

DRYING NEGATIVES.

BY W. H. WALMSLEY.

UPON first thought it would seem that this subject must be so familiar to every photographer as to render any further allusion to it quite superfluous. But quite recently an interesting and valuable article upon drying negatives appeared in the pages of the *British Journal of Photography*, which, no doubt, will be of service to many of the newer recruits in the army of photographers who have not read all of the literature hitherto published. For their benefit I venture to add a few hints on the subject, the fruits of many years' practical experience in negative making.

Premising that the fixing and washing have been (as they should be) very thoroughly done, the drying without leaving marks of any kind or the gathering of dust upon the surface during its progress, becomes one of the most important, as well as the final act in making the negative. And yet it is a very simple and certain one, if rightly done. Holding the plate beneath a tap of gently-flowing water, wash off both surfaces with a tuft of soft absorbent cotton, giving due care not to scratch the gelatine, and ending with a rinse of filtered water, since none from the tap alone is quite free from gritty particles held in suspension, but which will flow off the gelatine surface held vertically beneath it. Now comes a very important procedure, which I have not seen in any article that has come to my notice, but one which I never omit, and always find to be attended with satisfactory results. It is merely to wipe the back of the plate perfectly dry with a soft absorbent linen towel, such as is used in wiping glass for table service. This not only removes all drops of water, which at times cause uneven dryness of the film, but also any superfluous emulsion which may be found on all makes of plates, leaving the surface perfectly dry, clean, and polished. The plate is then to be placed in an ordinary drying-rack, which leaves one corner only as the lowest extremity towards which the superfluous surface moisture of the gelatine will run. The more rapid the drying from this time on the better, for many reasons. To insure this, do not put the plates too near each other in the rack. There should be not less

than two inches between them, and the face of one should always be next to the back of its neighbour. A gentle current of warm (not hot) air is the most efficient agent in rapid drying. It must, of course, be free from dust. If the rack be set anywhere in a natural draught it will be found that the latter greatly accelerates the drying to a remarkable extent indeed, as I had a demonstration of during the present day. A pleasant southerly wind was blowing, with a considerable degree of humidity, and some rain-threatening clouds hanging quite low. The temperature was mild, and the window of my room wide open. The atmosphere within was such that long experience told me would not allow a gelatine plate to dry in several hours. The day was growing old, and I had just finished washing one from which it was necessary to procure a print before dark. I therefore placed the rack, carrying it on the broad sill of the window, lowering the sash to nearly the top of the rack. A door in the room opposite to the window being opened caused a draught of air to flow over the negative, drying it perfectly in exactly forty-three minutes. On one of our usually dry days it would probably not have taken more than half that time. A heavy rain having fallen all of the preceding day, the air was perfectly free from dust, and the finished negative is as clean, bright, and beautiful as any I ever saw.

On no account should an attempt be made to dry a negative before an open fire or near a hot stove or steam radiator, as almost certain injury will result from so doing. But if one has a furnace in the basement, with current of warm air issuing from a register in the work-room, an ideal method of drying negatives in the winter season is at his disposal, provided he is sure that no dust is borne by the current. The rack carrying the negatives should be placed in front of the register, but at a little distance from it, to insure safety from over-heating. I use this method of drying habitually in cold weather; have never known a negative to be injured in any manner thereby, and have frequently had them to dry within ten minutes after being placed in the rack, and *always* with the backs wiped as directed. The current of air from an electric fan is also a most efficient agent in the drying process. All this, however, is in the dry climate of the United States. In the moister one of England the necessary time would doubtless be lengthened.

THE PERSULPHATE REDUCER.

By G. WATMOUGH WEBSTER, F.C.S., F.R.P.S.

It is now several years since I first brought before the readers of THE BRITISH JOURNAL OF PHOTOGRAPHY the results of my experiments with persulphate of ammonia as a reducer, with especial regard to its valuable selective action on insufficiently exposed negatives, the paper detailing them being, I believe, the first published account of this special and peculiar selective action of the chemical. Since that time I have used the salt on some hundreds of negatives, and I have come to esteem it as one of the most valuable additions to the photographic laboratory shelves.

Much attention has been given to the chemical reactions accompanying the reduction of the image by the persulphate; but this is

scarcely the place to discuss them, though it may be desirable to call attention to an aspect of the question which has considerable practical bearing upon the operation of reducing. The first published announcement of any sort bearing upon the use of this chemical before it was recommended as a reducer was as to its solvent power upon the gelatine itself of the negative film. This mechanical property has been largely lost sight of; but it is permissible to believe that it should be an important factor in the consideration of the reactions that take place. Its practical bearing is quickly seen when dealing with negatives that have been treated with alum, a practice largely employed by the users of certain brands of plates; indeed, there are many photographers who make a point of treating all their negatives with alum to avoid frilling, an annoying effect which is still far from being relegated to the list of defunct methods. An alum-treated negative needs to be kept in the reducer about four or five times as long as one not so hardened. This can scarcely be due to any impermeability brought about by the alum, as, before drying, the alumed film is still soft and, presumably, incapable of inhibiting osmotic action. I can only attribute the slow action to the insolubility of the gelatine. So far I have not tried any "tanning" agents other than alum; but I propose experimenting with formalin, etc., and if there should be anything worthy of record the readers of the "Journal" shall be made acquainted with it.

There is one thing about the persulphate which is worth mentioning, and that is that there seem considerable differences in the properties of various samples purchasable at one or other of the manufacturing chemists who supply it. I have had some samples the solutions of which after a week or two developed a strong odour, more resembling nitrous acid in smell than any I remember. Other samples have been kept in solution for months without any such effect being developed. It is desirable to keep the solution in a stoppered bottle, but some of the former kind which happened to have been stored in a corked bottle developed the strong smelling vapour referred to, and to such an extent as to corrode the cork. So far I have not had an opportunity to subject this vapour to chemical tests to ascertain its composition.

With regard to the actual use of the persulphate for reduction, premising that I never use it for negatives in the slightest degree over exposed, the Howard Farmer reducer being then the best, I may say that 2 per cent. is the maximum strength I find advisable. When I first recommended its use for this particular class of negatives I referred to the liability to spots and markings brought about by its use—an observation met at the time by a chorus of opposition. Later experience, however, proved the justice of my observations. The true secret of avoiding these spots and markings is simply not to exceed a strength of 2 per cent. in making the reducing solution. That is about nine grains to the ounce. It is not necessary to use distilled water as a solvent of the salt; indeed, there is an advantage in employing a hard water, as the gradual development of a milkiness on the surface of the plate indicates the commencement of the visible action of the salt, and the increase in this milkiness forms a good indicator of the progress of the action.

When it has proceeded so far, the colour of the image is completely changed to a sickly pale brown of difficulty judged printing capacity. When the negative is almost, but not quite, sufficiently reduced it should be removed from the reducer, and vigorously washed under the tap for a few seconds, and then quickly immersed in a solution of sulphite of soda of about 10 per cent. strength. It is better not to dispense with this slight preliminary washing, for there is otherwise a tendency for the sulphite solution to produce iridescent and other surface stains, most of which, however, are removable by hypo solution. In conclusion, I would again repeat that persulphate of ammonia has invaluable, and, at present, inimitable reducing properties.

INDIAN JOTTINGS.

By H. MANNERS.

In each year's ALMANAC numerous formulæ for the pyro-soda developer are always given, but these are invariably with the pyro and soda in solution, and generally to be mixed in equal quantities for developing. Now in the first place I have never been able to see any advantage in having or keeping pyro in solution; in fact, it has many disadvantages, not the least being the extra weight and bulk. Nothing can possibly be simpler and better than having a $\frac{1}{2}$ oz. bottle of dry pyro, or, better still, the new form in crystals called pyrax, and with a small bone spoon it is very easy to take out, say 5 to 6 grains of the dry pyro, put in the developing cup, and add the needful soda or other solution. By for a day or two first weighing the pyro or pyrax, and then putting it in the spoon, one soon learns to be able to take out the required quantity straight from the bottle without always weighing. With pyro soda I never use bromide, it is not needful. The amount of soda solution can always be modified to suit the particular negative in hand, and for the experienced worker pyro-ammonia or pyro-soda are out and away the best of all developers, owing to the latitude and power one has with them. For anyone travelling about and developing en route the great object is to save weight and a number of unnecessary bottles of solution. Judging from the formulæ given by the different plate makers, it would seem as if water was a rare fluid to obtain, whereas for all ordinary purposes clean drinking water is all that is required for making up any solutions for developing, fixing, etc. What is much wanted in the pages of your invaluable ALMANAC is a good simple formula for a very concentrated solution of ordinary carbonate of soda and soda sulphite, 10, 15, 20, or 30 minims of which can be measured off and added to the pyro, and water at time of development. With a small bottle of dry pyro, the same of the concentrated soda, and some dry hypo, a tourist is fully equipped for developing his negatives while on his travels, and these with a couple of vulcanite trays to suit the size of the plates he is using, can be readily packed in a small box and stowed away in his trunk. Developing can always be done in the evening or at night. A couple of folds of Turkey red cloth or Canary medium, folded round an ordinary hurricane lantern,

gives a perfectly safe light. After fixing and washing the negatives can be stood up on edge, face inwards, to dry during the night, and are ready next morning to be packed away. There are two points I would like to impress on all amateurs, especially on board ship and in tropical countries: (a) Not to leave unexposed plates or exposed plates in the camera longer than can be helped; (b) to always develop as soon after exposure as possible. Plates exposed or unexposed deteriorate very rapidly, and invariably yield poor flat negatives. I have myself been a photographer since the old wet plate days of the early seventies, and having at one time been out of a billet (I am an indigo planter) for a considerable time, had to fall back on photography to make bread and butter (in the wet plate days), and did uncommonly well at it. While doing this I came across an old correspondent of yours, Captain G. W. Stretton, who had given up seafaring and taken to photography. Though rival workers in the same station (Indian towns outside of the presidency towns are called stations) we became great pals, and kept up a regular photo correspondence to the time of his sudden death at Rangoon some three years ago. Having as said worked as a pro., and still keeping it up in my spare time, I am looked upon as an expert in my district, and am constantly being sent plates to develop, or negatives to print from, or pass opinions on, and also am often asked what is the best camera to use, what is the best developer, or the best and easiest way of printing. Now as regards the plates and films sent me to develop—well, I need only say that with the majority my cusses are free and deep. The only idea of the common or garden amateur who possesses a hand camera seems to be that he can put in his plates or films, generally the most rapid he can buy, three or four months beforehand, just press the button, irrespective of light or subject, and then when it suits him, after perhaps a month or two more, to take the plates out of the camera, of course bang in front of a strong light, and send them off to some unfortunate being to develop and print for him. Rather a good instance of this has lately happened with me. A friend lately out from England told me he had bought a hand camera, and had taken some snapshots on the way out, and asked me if he sent the camera to me with the plates in it would I develop them for him? I agreed, and the camera was sent. As usual with work of this kind I set about the development very cautiously, but found every plate (12) hopelessly fogged and spotted, and could not get a single passable negative out of the lot, much to my friend's disgust when I sent them to him. (Of course, it was my fault.) When next we met I made inquiries, and found that the plates (extra rapid) had been put in at the shop where he bought the camera, two months before he left England. He had done the pressing the button trick at various objects on the voyage out, leaving the camera lying about on deck and in his cabin, and had been out here some three months before he sent them to me to develop, so the plates had been in the camera fully six and a half months before they came into my hands, with the natural result as aforesaid. Now the moral of this is, do not keep plates longer in the camera or dark slides than can be possibly helped. Bear in mind, in the first place, that there is no camera or dark slide made that is absolutely light tight, or at all

events not air tight, and plates, especially the rapid series, will deteriorate in them. This is specially the case at sea, the sea air affects and spoils plates or films, the latter more than the former, very quickly. It would be interesting to get a record of the number of plates or films the ordinary tourist or globe-trotter spoils by not using a little common sense. Doubtless it is a grand thing for trade, and the makers of plates and films should bless the Kodak and other hand cameras. Now for the two common questions so often asked. What is the best developer? and which is the simplest printing process? To the beginner or ordinary amateur I say the simplest and easiest developer is undoubtedly hydroquinone, which can always be had in solution (two bottles) from any dealer in photo goods all over the world, with full instructions on the bottles. Thomas's is, I think, one of the best; 2oz. of this will do from four to six quarter plates consecutively, and if plates be good and exposure correct (bearing in mind that light is essential in securing a strong, bright negative) will yield nice clean negatives which print quickly. For prints the quickest and easiest process is bromide paper printing. A great many amateurs go in for bromide prints, but why so many use the uncertain, messy oxalate developer I have never been able to understand. For certainty and simplicity nothing can beat Rodinal, and a small 3oz. bottle of this goes a very long way. For use take 30 minims of Rodinal, and add $2\frac{1}{2}$ oz. of clean water. This will do 12 consecutive quarter plate prints. Those done last will, of course, take a little longer to come up to the right colour. With Rodinal there is no need of the acid intermediate bath. Just pass prints into a tray of water, give one quick rinse, and pop into the hypo fixing solution. It must be understood I do not say that there are not many other good developers for bromide work, but for the beginner I assert nothing is simpler or better than Rodinal.

WARM TONES ON LANTERN SLIDES.

By E. J. STEER (CAPETOWN).

A variety of tones from red to brown may be readily obtained by using either "Gravura" or "Alpha" lantern plates. For contact work the former plate is the easier to work, as exposure and development may be carried out in an ordinary room lighted by gas or paraffin oil. A "Gravura" slide after fixation is often of an unsatisfactory colour, and this may be readily remedied by toning with sulpho-cyanide and gold after washing. The "Alpha" plate is equally suitable for either contact or reduction. The exposure for reduction is somewhat prolonged as compared with a bromide plate, but the brilliance and beauty of the result amply compensates for the slightly increased trouble involved. In reducing from whole plate to lantern size, using a "Cooke" 5in. lens F. 22, against a bright blue sky, I find an exposure of from three

to five minutes sufficient, and the resulting slide is of a warm brown tone. The developer should be weak and restrained, say two parts of water to one of normal hydrokinone developer, and one grain of bromide per ounce. By toning a warm "Alpha" slide, distant mountains or sun-lit sea may be given a natural blue tint, and if the toning be not carried too far, the foreground remains of a warmish tone, and this is very effective on the screen. When developing slides for toning with gold, it must be remembered that the process of toning intensifies the slide, so that the slide, after fixation, should appear somewhat thin. Do not use the *combined* toning and fixing bath for these plates, or the tone will gradually fade. By toning in a weak sulpho-cyanide bath, after fixing and washing, the tone is permanent. I have some specimens which are as brilliant in tone as when made five to seven years ago. Carbon tissue may be used for the production of lantern slides in various tints, the "sea-green" tissue giving beautiful slides of certain marine subjects.

ONE OR TWO LANTERN SLIDE MAKING HINTS.

BY REV. F. C. LAMBERT.

An unexpected need recently caused me to have to make a few lantern slides very hurriedly. The plates I happened to have on hand were very old ones, which had been stowed away in a dark room cupboard, by no means overdry. The stock bottles of developer about to be used contained only a small quantity, stale and considerably discoloured. There was no time to get new plates or make up new developers. The exposures were by contact—gas flame as illuminant—and had to be generous. With an ordinary negative one minute's expose to a No. 5 Bray's burner at 3ft. distance was under rather than over exposed. Development was by hydrokinone and caustic potash in the usual proportions, with a minimum of bromide. Development took a considerable time, and resulted in a positive badly stained a yellow brown colour and surface iridescence all over the plates. A few trials showed that the iridescence could be removed by blotting off surface moisture and then gently rubbing with a bit of rag moistened with methylated spirit. The proverbially obstinate hydrokinone developer stain I found to yield to a fairly strong bath of hypo and ferricyanide reducer. As a guide to quantities, take a crystal of ferricyanide about as large as a large pea or small hazel nut. Throw this into a graduate, fill up with water, give a swirl or two round the vessel, and pour away the water, leaving now a ruby red crystal. Now add about about 2oz. of a "one in five" hypo solution. Crush the crystal, stir well, and then allow any undissolved particles to subside. Then gently and slowly decant into the dish about 1½oz. of solution. This will remove the stain.

Some workers have complained that the above way of preparing the reducer gives rise to clear pinhole spots. These are due to not

allowing sufficient time for the fine particles of ferricyanide to subside before decanting off the clear part. A tiny crystal of ferricyanide settling on the film will almost surely yield a clear spot. One other hint in this direction. Suppose the original negative to be just a trifle too thin, so that the resulting slide is not quite bright enough. First, expose by contact, but cover the face of the printing frame with ground glass. Cut down the exposure to the practical minimum. Then carry development as far as possible, even to the stage of veiling the shadow details. Fix and transfer to the above reducer, just long enough to clear away all fog veil. To prevent this reducer yielding any slight tinge of yellow stain it is needful (a) to use freshly dissolved ferricyanide, and (b) to see that the film is first well saturated with hypo solution before it comes in contact with the mixed ferricyanide and hypo.

ON THE ASTIGMATIC FOCI.

By C. WELBORNE PIPER.

Those who have made any careful study of different optical text-books cannot have failed to remark the discrepancies that appear to exist between the various descriptions of the astigmatic foci. One writer will describe them as approximate lines with an approximate circle at the mean focus. Another as approximate lines with a cross at the mean focus. Sometimes we read that the primary focus is an arc of a circle, and the secondary a figure of eight, and sometimes that they are both ovals.

There are various reasons for these apparent contradictions, but the best way to arrive at the truth is to study the subject experimentally and so ascertain the facts for one's self. The following is a brief summary of the possible general forms of the astigmatic foci of light pencils passing through an ordinary lens, or centred combination of lenses, fitted with a circular aperture.

We may premise that the presence of astigmatism is always denoted when the image of a point object shows elongation in two different directions, at right angles with each other, in two different positions of the focussing screen, these positions being styled the primary and secondary foci of the light pencil. There is no astigmatism if the focus is always elongated in the same direction; it is the change of direction that indicates the presence of that particular aberration.

Further, we must premise that there are three forms of aberration (independently of chromatic aberration) to which a single light pencil is liable, as follows:—

1st.—Longitudinal or central "spherical" aberration.

2nd.—Radial aberration, or astigmatism.

3rd.—Lateral aberration, or coma, the presence of which involves that of the other two forms of aberration.

By way of explanation it may be noted that all three forms of aberration can fairly be classed as varieties of spherical aberration, though, as a general rule, the first variety alone is so named. It can be shown

that the first form includes the other two, and also that all three are only varying phases of one primary defect—namely, the existence of a non-spherical wave front. Spherical aberration is not, perhaps, a good term to use, but it appears to have been originally employed under the impression that it described an effect peculiar to lenses with spherical surfaces. As this is not strictly correct, and the defect is actually one of non-sphericity, there seems to be little excuse for retaining the term, other than the want of a more appropriate one.

When astigmatism exists the possible forms of the primary and secondary foci are four—viz., a symmetric oval, a non-symmetric oval, a symmetrical figure of eight, and a non-symmetrical figure of eight. The mean focus may be a form of cross, or a figure of symmetrical form approximating to a circle, or a non-symmetrical figure of eight.

The possible combinations of these forms are, speaking generally, three in number, as follows:—

1st.—Symmetric figures of eight at the primary and secondary foci, and a cross with oval arms at the mean focus.

This arrangement is characteristic of pure astigmatism; that is, of simple radial aberration, unaccompanied by either of the other two forms. Undoubtedly this is a rare type of astigmatism, and it is even open to question whether a lens ever produces it perfectly.

2nd.—Symmetric ovals at the primary and secondary foci, and a symmetric form approximating to a circle at the mean focus.

This arrangement is characteristic of mixed astigmatism; that is, of a combination of radial aberration with longitudinal aberration, the latter being responsible for the alteration in the forms of the foci. This is a common form of astigmatism, such as is produced by a lens free from coma, but imperfectly corrected for the other two aberrations. Any ordinary rectilinear lens shows mixed astigmatism. Possibly there may be intermediate cases of mixed astigmatism in which the cross form is not quite lost at the mean focus, while the other foci are not perfect ovals, but I have not actually met with such a case.

3rd.—A non-symmetric oval at the primary focus, a non-symmetric figure of eight at the secondary focus, and a non-symmetric form approximating to a figure of eight at the mean focus, the exact form of which is subject to many variations.

This arrangement is characteristic of a pencil with lateral aberration or coma, which defect, as before pointed out, comprehends astigmatism. The lateral aberration is responsible for the non-symmetry of the foci, which are, in fact, simply the foci of mixed astigmatism distorted laterally in the direction of the primary plane. Eliminate the lateral aberration, and mixed astigmatism is left. An ordinary single "view" or "landscape" lens will show the third form of astigmatism.

None of the foci described have any real resemblance to lines, and there appears to be no advantage in describing them as "approximate lines," a definition that is evidently responsible for many misconceptions. The theory of focal lines is a mathematical conception only applicable with accuracy to the hypothetical case of an indefinitely small pencil. With a pencil of appreciable size projected through an ordinary lens a truly linear focus could only be produced with a non-circular aperture of special form.

SOME PHOTO-MICROGRAPHIC HINTS.

BY F. MARTIN DUNCAN.

I can strongly advise all who are interested in photo-micrography to try the effect of a fluid screen, consisting of a saturated solution of acetate of copper. The screen should be about $\frac{3}{16}$ in. thick, and should be placed directly in front of, and close to, the source of illumination. The improvement in definition, and the increased depth and crispness of the image, is most marked. Apart from photographic purposes, this acetate of copper screen will be found most useful when examining objects under the microscope, helping to resolve more clearly the very finest markings; while the cool, bluish-green light is most delightful and restful to the eye when working with the microscope for several hours at a stretch. I have used it daily for the last two years for research and photographic work, with a very considerable gain in comfort and success.

In taking a photo-micrograph of a stained specimen, better contrast and gradation can often be obtained by the use of a coloured light filter. For this purpose round cover glasses can be used which will fit into the carrier beneath the substage condenser, coated with stained collodion. It is best to make your own collodion, and this can be very easily done by dissolving a small quantity of Schering's celloidin in equal parts of ether and pure alcohol. The aniline stains should be dissolved in pure alcohol, filtered, and then added to the collodion emulsion in quantities sufficient to produce the required tint. This operation requires a little care and judgment, to avoid getting too deep a tint; and it should be borne in mind that the stains generally dry a little darker than they appear when wet. The most useful stains are fuchsine, methylin blue, gentian violet, malachite green, and picric acid. It is well to coat two or three cover glasses with the same stain, but of varying depths of colour.

Lastly, a word of advice to the beginner; always use an isochromatic plate, and see that it is properly backed. Messrs. B. J. Edwards' series of isochromatic plates are capital for all micrographic work, and can be purchased ready backed. Pyro-soda, and glycin you will find two of the best developers; and if you take my advice, you will always develop your photo-micrographic negatives by time development, and so avoid wasting many plates. The following is the pyro-soda formula I always use:—

Solution A.

Pyrogallie acid	...	...	...	...	1oz.
Metabisulphite of soda	...	...	...	...	1oz.
Water	...	...	...	...	20oz.

First dissolve the metabisulphate, then add the pyro.

Solution B.

Carbonate of soda	...	...	...	12oz.
Sulphite of soda	...	...	...	4oz.
Water	...	...	...	40oz.

To use take 2 drachms Solution A, 4 drachms Solution B, and make up to 2oz. with water. Put your watch in such a position that the light of the dark-room lamp or window illumines the second hand. Note the exact second you pour on the developer, and watch for the first trace of the image to appear; the instant you see it beginning to come, note how long it has taken, and multiply that time by six, which is the factor for the above formula, and the resulting product will be the proper length of time to carry development. Thus, supposing the image takes 30 seconds to appear, you will develop for three minutes after its first appearance. With glycin (formula given on page 802 BRITISH JOURNAL ALMANAC, 1902) the factor is seven; so if the image appears in 30 seconds, continue development for 3 minutes and 30 seconds.

OUTDOOR PORTRAITURE.

BY OSBORN THORNBERRY.

There is no doubt that photographic portraiture in the studio is produced with the minimum amount of trouble, as compared with it outdoor. This is, in my opinion, due to the operator, who studies the lighting, and can in an instant tell how to improve his subject by the lifting or lowering of a blind. On the other hand, portraits taken in the open, if the lighting has been properly arranged before the sitter is placed in position, will be more lifelike—not so stiff—and softer in effect.

The greatest drawback to the outdoor operator in this island home of ours, is the weather we have. During the winter months there is hardly a day in which portraits could be taken without the sitter either suffering from the effects of fog, frost, or rain. While the fine weather lasts, though, from May to September, some very fine pictures can be obtained.

I am surprised that so few photographers take advantage of the wealth of splendid natural backgrounds that our country abounds in. One has not very far to go before a rustic style or a picturesque stream is found. How natural a figure would look posed with these surroundings. There is no trouble in selecting the lighting of the background to correspond with that of the figure, as in a studio, for nature does that. The foreground is already there, and no doubt is broken up in appearance, and will not have that artificial plaster and blacking look. If the background comes out too dark and prominent, it is an easy matter to tone it down by the use of a little matt varnish on the back of the negative. This will have the double effect of throwing the figure into relief, and at the same time pleasing the eye.

The majority of photographers of to-day aim at producing a photograph which is merely a reproduction of the figure of the sitter, with no attempt at making a picture. As long as it is a likeness, it does not matter. It is my opinion that, with our picture galleries and art exhibitions, the public is gradually becoming educated to what is a picture and what is not, and the time is not far distant when they will demand, not only a likeness, but a picture.

In the studio, unless the means are ample for supplying effective backgrounds, picture making is very limited, but this is not so outside, for the scenery will cost nil. There are several photographers who make a special study of outdoor portraiture, and one cannot help admiring the simplicity of them as compared to the elaborate arrangements of the studio figure studies; yet how natural the former look to the apparently strained position of the latter.

I am afraid that the studio operators give but little thought to outdoor portraiture, and I think this is where the mistake is, for many an amateur can beat them at it hands up. The amateur, of course, gets more practise at it, by reason of not having a studio; he is compelled to take the portraits in the open. The subject, I think, is worth studying, and will certainly repay those that go in for it.

A dull day, on the whole, is the most suitable, on account of the soft results, but if the light is too brilliant a great deal of it may be shut off by means of a sheet of canvas hung on a line (of course, not to come within the angle of view of the lens).

Full and three-quarter length portraits are best taken with a natural background. For bust portraits it is well to have a plain white or cream one, but a slate-grey coloured sheet does not give bad results. For full and three-quarter lengths portraits no toning down of the light, unless the sun is shining, will be required. It becomes a necessity though, for the bust portraits, so as to give a certain amount of shade to the face, or the resulting negative will be flat. In taking the latter, a white sheet may be placed on the sitter's knees, to throw light up under the chin, nostrils, and eyebrows. Too much top light can be cut off by an open umbrella, fastened to a frame, or held by an assistant in such a position that it tones down the light on the subject, but does not show in the photograph.

Too many photographers, especially amateurs, are in the habit of taking groups and portraits in their back gardens, which are narrow and surrounded by red bricked walls. Now these latter are one of the deadliest enemies to good photographs. The red walls casting a red glow on the faces, and red being less actinic than most colours, it results in the faces appearing in the prints as though they were dirty. The best plan is to cover any red walls in the vicinity with sacking or any other handy material.

Another important factor in outdoor portraiture is the lens. This should be as long a focussed one as possible, and then the perspective will be more after the style of an artist's ideal. It should not be stopped down to any great extent. F11 in a dull, and F16 in a brilliant light will be found quite sufficient. The more "out of focus," or fuzzy, the background is, the greater will be the relief of the figure.

THE RELATIONS OF PHOTOGRAPHY TO OTHER SCIENCES.

BY PHILIP E. B. JOURDAIN.

Photography seems to occupy a unique position with regard to its close relations with so many branches of science, and for this reason is of the greatest importance, both for forming a practical introduction to these sciences, and for providing definite problems in them. The former advantage touches on an educational question which has been discussed, especially of late, in England and Germany; but it is the latter advantage that I wish to emphasise in this short note, by giving some examples of the problems whose solution is important for photography, and which present themselves naturally to a photographer; so that the problems, which are very good exercises in other sciences, have (what seems essential for really educative problems) an interest of their own.

Of course, it is not here a question of the science of photography itself (photo-chemistry), and I shall not deal with the many interesting chemical problems, which may fairly be considered as belonging to this science. My examples are drawn from those optical questions which are of the greatest importance to the practical photographer.

Naturally, the first subject is the lens. The problem of forming an image by a lens leads at once to the consideration of the general laws of rays passing through a symmetrical optical instrument, and this again to the more general theory of systems of rays (of Hamilton). This theory has always seemed to me particularly characteristic of the way in which very general questions are dealt with in mathematics. But I pass to more elementary problems.

The efficiency of shutters—these questions are splendid examples in elementary integral calculus. I always have regarded it as fortunate that many years ago I worked out simple cases by the elementary methods at my disposal. Later, I extended these to more complicated cases, and thought the results sufficiently interesting to publish them ("Photography Annual," 1898). The more advanced treatment I shall hope (as they appear interesting) to publish at some time.

The swing back.—It was Mr. Chapman Jones who long ago drew my attention to this problem (photograph without using the swing back; how much must an enlargement be tilted towards or from the faulty negative that lines may be corrected?). He told me (I do not think to discourage me) that he had proposed the question to a young mathematical friend, who had, unfortunately, died before finishing the solution. However, the solution only requires patience and elementary trigonometry. I delayed working it out so long that Mr. C. Welborne Piper published first the (I think) complete solution in *THE BRITISH JOURNAL OF PHOTOGRAPHY*.

Finally, I should call attention to the highly interesting investigations of Lord Rayleigh and M. G. Lippmann on the theory of interference (photochromy), of which I have given some account in *THE BRITISH JOURNAL OF PHOTOGRAPHY*.

ANOTHER NOTE OR TWO.

By F. J. MORTIMER.

The Editor's annual request for "a short article for the ALMANAC," comes all too soon, and tells of yet another year nearly spent. A survey of my note-book reveals little new this year, but the following may be useful:—

It has often been a puzzle to me that makers of calcium tubes for the storage of platinotype papers, etc., should send them out with such poor sort of rubber bands around. The new lever-lid tins seem a great improvement, but as the "airtightness" of the rubber band kind depends practically on the rubber bands, a substantial and reliable article should certainly be supplied. It will usually be found that a piece of string loosely tied round the tube is as effective as the rubber band (sent out by the maker) after a month or two's wear. Now, if you are a cyclist, you may have an old inner tube by you of which parts are still sound. If not, such a tube is easily obtained from a cycle dealer for a few pence. The average inner tube that has been discarded is generally good strong rubber. The cheap, porous, nasty one is on your bicycle. Cut off a couple of sound sections, say, about two inches each, from the inner tube, and stretch it round the junction of the calcium tube lids. Then cut off two more sections, say, three inches each, and stretch them over the first pieces, and, provided the rubber and the tin have no latent leaks, it will be very "slim" air that is going to creep into that calcium tube.

Have you ever had an old unmounted albumen or P.O.P. print, all cracked and dirty, and greatly desired to copy it and not reproduce the cracks, etc., at the same time? Proceed thus: Pour glycerine over the print, and carefully work off as much surface grubbiness as possible, with a plug of cotton wool. Then squeegee the print—still wet with glycerine—on to a clean piece of glass. This ensures a perfectly even surface and abolishes all grain and abrasions. All cracks and deep markings now appear black or transparent. These can be temporarily abolished also by damping a piece of stiff plain white paper and squeegeeing it on to the back of the print.

The print can now be easily copied in the usual way—through the glass, and afterwards removed—carefully washed and dried, and should be no worse for its bath.

While making some enlargements the other day I noticed that those obtained by artificial light, through a condenser, gave prints of much coarser grain than those obtained by diffused daylight. The reason appears to be that each grain of silver composing the image gives a minute iridescent spark (diffraction), when the source of light is the actinic value is low, as with the oil lamp—and each of these points of light is, of course, duly reproduced in the projected image, and causes the apparent graininess. The phenomenon can be easily seen by looking through a thin negative at a bright light, but is absent when the light is diffused. The only remedy when using a condenser appears to be a piece of finely ground glass, used between the negative

and the source of light. This will be found to lengthen the exposure about 25 per cent.

A pair of white silk gloves was found in my dark room the other day. There was much ribaldry, but if every other photographer who has occasion to cut up sheets of sensitised paper (P. O. P., bromide, etc.), or uses large size paper for direct prints or enlargements, kept a pair of clean white silk or cotton gloves in his dark room also, their cost would be more than covered in a very short time by the absence of finger marks on the aforesaid paper. Everyone knows how difficult it is to deal with a self-willed sheet of tightly rolled sensitised paper in the dark room, and the frantic efforts to straighten the same, without unduly touching the delicate surface, generally results in a plentiful crop of marks from perspiring fingers. The confidence and ease with which the sheet can be manipulated by fingers encased in clean white cotton gloves has only to be tried once to be everlastingly appreciated, to say nothing of the saving of prints and wear and tear on one's self-respect.

DITCHWATER PHOTOGRAPHY.

By J. DORMER.

There is a well-known aphorism which succinctly states that some are born great, some achieve greatness, and some have greatness thrust upon them. Of these three classes, the one which has the most pressing claim on the attention of the photomicrographer is the last, for it is obviously his business to thrust a frequently posthumous aggrandisement upon the objects which pervade the field of his microscope. Now, amongst the inexhaustible number of objects thus magnifiable, few present such a variety of remarkable features as the minute inhabitants of ditch and pond water. No microscopist, indeed, lacks material for study, so long as there is a pond anywhere in his vicinity, and the more neglected that small sheet of water is, the vaster the store of animal and vegetable life it will probably contain. Even Londoners can find a surprising quantity of microscopic creatures in the ornamental waters of the parks, though naturally these lakelets are not sufficiently ill-tended to attain the diversity of contents which a country ditch will frequently reveal.

But, from a photographic point of view, these planticles and animalcules are inadequately exploited. Especially is this true of the latter order of animated beings. Though including a multitude of odd and interesting forms of life (one sometimes obtains a score or more species in a few drops), they to a considerable extent escape the wooing of the photomicrographer. Minute "plants," such as diatoms and bacteria, are posthumously aggrandised with a frequency which almost conveys the impression that animalcules do not deserve similar fame. In reality, however, the difficulty of preserving many of these specks of protoplasm after death, joined to the difficulties arising from their

usual liveliness, whilst in the water of the living, furnishes a potent reason why photomicrographs of the lowliest invertebrates are uncommon. Continually in motion during their existence, jerking, gliding, wriggling, and darting hither and thither, the rapidest plate and the most careful lighting may easily prove unable to cope with restless subjects of such crystalline transparency. Under these circumstances one is continually reminded of the man who, when he read that "An evening at Palermo is a beautiful thing, sitting on the sea-shore, listening to the waves," strapped on a choice assortment of hand cameras, and started off by the next train. He did not succeed. He said he guessed it must have shifted some, before he got there.

Here, then, appears to be a field of operations, which is not overcrowded, photographically speaking. It is a field—perhaps I ought to say ocean—in which the manipulative convenience of the apparatus employed is of first-rate importance. Some subjects are, however, more feasible than others. For instance, amongst the Protozoa (of which alone there are some sixteen hundred genera), any preliminary attempt at the portraiture of a jerky ciliate, or of a nightmarish amœba, bulging its protean way with horrid endoplasmic viscosity across the microscopic slide, is likely to prove a disappointment. But there are more quiescent creatures, such as the little interesting tube-dwellers, which, securely housed in delicate glassy vases, remain almost immobile for considerable periods of time with their radiating filaments widely expanded. But beware of the gentlest shock! For then, like Jack-in-the-Boxes reversed, they huddle with lightning speed at the bottom of their vitreous dwellings, only to again cautiously protrude themselves when the anticipated danger is past. Or, if these be too ethereal, there is that curious creature the hydra, visible to the naked eye, even, attached to some water plant, and famed for the indifference with which it either puts its food into its stomach, or brings its stomach up to its food. And so on, ad infinitum!

We can, most of us, recall the shock, experienced when first we viewed the "lively" picture of a magnified drop of water projected on the lantern screen; and the consequent, but erroneous, impression that, with each drop of the liquid used to quench our thirst, menageries were engulfed. One still anticipates the time when some kinematograph will perpetuate the thrill; but, in the meanwhile, the hoi polloi of the ditch await their free enlargements, contentedly pursuing their gormandising ways in blissful disregard of photographic possibilities. Their carte-de-visites are not even yet obtained, in the vast majority of cases, though microscopic slides of rotifers and a few other subjects are at hand commercially. Moreover, it is to be expected that the non-biological reader is ready with the incredulous inquiry—What would be the good of them? To which question, without invoking the classic rejoinder anent the baby, I would reply by merely asking him to pause and consider the dishonorificabitudinity of his floccinaucinihilipilification of such things.

USING AN ACTINOMETER.

BY ALFRED WATKINS.

To use an actinometer (exposure meter) is to make an exact observation. To make an exact observation, although in this case a very simple one, requires firstly an appreciation of what the observation is, and secondly, some amount of practice in making it. Many who try an exposure meter for the first time fail in both these requirements, and condemn the instrument.

An actinometer contains a sensitive paper which darkens rapidly in light; the stronger the light the quicker it darkens, and the strength of the light is estimated by making an exact observation of the length of time required for the paper to attain a certain degree of darkening. This degree of darkening is judged by a painted strip of the standard darkness placed alongside. It is, of course, necessary to make this standard tint as near as possible the same colour as the paper when it attains its standard darkness, but this colour is merely an accidental attribute, and must not be made the main object of the test. We develop a negative to get a certain degree of printing density or darkness, not to get some particular colour of deposit, and the same idea should be present when using an actinometer. There is a point when the sensitive paper is lighter than the standard tint, and another point when it is darker; the point when it is neither lighter nor darker is the exact match. Although with recent improvements in actinometer paper it darkens through the same succession of colours in varying weathers, it must not be forgotten that it is probably impossible to provide a painted tint which is an absolute colour match of a darkened sensitive paper, the two substances being unlike in character. Those who have any difficulty in using an actinometer should try the plan of half closing the eyes when making the observation, holding the meter at arm's length. This simple plan makes a great difference.

LIQUID LIGHT FILTERS.

BY ARTHUR PAYNE, F.C.S.

Various methods of extemporising a cell for use as a liquid light filter have been described from time to time. The favourite form is that which is made by clamping a circle of indiarubber tubing between two sheets of patent plate glass. The ease with which it may be taken to pieces facilitates the cleansing of the cell when it is necessary to change the dyed fluid, and the inexpensive character of the materials of which it is made is not its least recommendation.

The writer has found that the substitution of a flat piece of india-

rubber, cut to the size of the glass walls, and with a circular opening cut out of the centre of the indiarubber slab for the purpose of containing the fluid, to be a slight improvement upon the indiarubber tubing. Suitable sheet indiarubber may be purchased of any reasonable thickness, and this facilitates the manufacture of a cell of any given internal thickness. This is an advantage, as it ensures that the absorption properties of a layer of liquid may be standardised, and then identical light filters may be obtained at will.

For the purpose of clamping the indiarubber between the glass plates the writer uses four brass spring clips, two of which are placed at the top, and two at the bottom, of each side of the cell. The spring clips must be strong, as it is necessary to exert some pressure upon the indiarubber, in order that the cell may be watertight. It is an advantage to smear the faces of the indiarubber slab with vaseline or tallow; these may in course of time attack and destroy the indiarubber, which, however, is easily replaced. Flat indiarubber rings, which are made of various diameters and thicknesses for packing the glands of engines and boilers, may be substituted for the slab of indiarubber.

REDUCTION OF NEGATIVE.

The method of reducing portions of a negative by rubbing with a pad of cotton wool or wash leather soaked with methylated spirit is only satisfactory so long as only a trifling reduction over a small area is necessary, as the action is so very slow. One day it occurred to me that a touch of Monkey Brand soap would materially help matters, but as the greasy part of the soap was manifestly objectionable, a cake was dissolved in hot water, and the powder allowed to settle. The water was changed frequently, until the soapy portion was gone and a clean powder left, which was dried and put in a wide-mouthed bottle. The wool pad with methylated spirit and a touch of this powder on it will work wonders in a short time. The powder appears to be very finely ground up glass. Perhaps some photographers do not know how useful this soap is for cleaning the fingers, dirty dishes, etc. In conclusion, I think this communication is a high-class photographic advertisement, and if you insert it should be paid for as such by the Monkey.

KEEPING PROPERTIES OF DRY PLATES.

By GEORGE EWING, CALCUTTA, INDIA.

THOUGH we follow with interest the latest advances of scientific and pictorial photography, the perennial topic of most interest out here is the keeping properties of dry plates. And it must always be so as long as we are never sure whether our most carefully-laid plans may

not "gang agley" from plates with rotten films. It was interesting therefore, to read in the *Bull. Francaise* that the Committee of the Société Française de Photographie, appointed in 1898, has just reported the result of its experiments on the preservation of dry plates. The conclusion, according to the *Bulletin*, "is that the method of manufacture is by far the most important factor, but that, other things being equal, plates will keep best if they are packed face to face, between them being placed sheets of very pure paper (Rives'), cut a little smaller than the plates, and previously kept in the dark for several months. The use of separators which allow air spaces between the plates is condemned." To people in India there could be no more lame and impotent conclusion. We see daily that when paper is placed between plates it corrugates with damp, and the corrugations impress themselves on the sensitive film; and we know that the only make of plates that absolutely defies the climate of Bengal has "separators which allow air spaces between the plates." That the method of manufacture is by far the most important factor may be readily admitted, but there seems to be no reason for doubting that the different methods of manufacture adopted by the leading British plate makers are quite good enough if only attention were paid to certain details which appear to have been overlooked by the investigating committee. Plates go bad in the tropics (1) by fogging, and (2) by becoming insensitive in proportion to their age. Of plates that fog without provocation *non ragioniam di loro, ma guarda e passa*; but it is in the power of plate-makers to prevent the other ill. I have found that the insensitiveness is caused by masses of mycelium, introduced either in the manufacture or by keeping in this country, which find in the gelatine an excellent culture medium. I published the result of my discovery some six years ago, and Professor Goodman, of the University of Illinois, has recently confirmed my statements by independent observation. Once the cause of a disease is found the remedy should not be far distant. Manufacturers can do much by filtering the gelatine so as to remove these cryptogamic fungi, for there is no use in tinning plates when the gelatine film is charged with fungoid germs; and having freed the gelatine, the plates must not be left to protect themselves. I have experience of dry plates in India extending very nearly to a quarter of a century, and I say boldly that, given a good plate to start with, the sensitive surface can be maintained almost indefinitely in any climate, if it be enclosed in several folds of suitable paper. When dry plates first came out there were few complaints of plates going bad, because in those days makers had an exaggerated notion of the sensitiveness of their productions, and wrapped them carefully in many folds of paper. As a protection against light action the wrappings were unnecessary, but they served a higher purpose as filters of cryptogamic fungi floating in the damp air of the tropics. Unfortunately plate-makers have shed these wrappers until now a single fold of brown paper is considered sufficient. Only one firm—Wratten and Wainwright—continues the old practice, and people in India do not need to be told whether the practice pays. Nobody asks of the London plates whether they are good, because we know they are, however long their storage in this country.

INTENSIFYING GELATINE PLATES WITH SILVER.

By G. T. HARRIS, F.R.P.S.

PLATES exposed by meter and developed by time are generally looked upon as automatically perfect, rendering superfluous such operations as intensifying and reducing. The occasional worker benefited, no doubt by the introduction of these aids, which prevent any very egregious blunders being made, but it is open to question whether a rigid adherence to them invariably produces the highest class of negative. For instance : during a tour in the New Forest I found that, though the exposure-meter indicated correct exposures with ordinary landscapes, it was quite misleading with such subjects as deep forest glades ; giving an amount of exposure enormously in excess of what was requisite with a colour sensitive plate. Hence one was forced to employ exposures of personal determination, as one did in the dark ages before the advent of exposure-meters and developing clocks. On development the majority of these negatives were found to be fully exposed, so, as soon as all detail was developed, the plate was washed and fixed, and opacity subsequently obtained by means of a silver intensifier. The result was, negatives of the finest possible printing quality, without the least trace of chalkiness, and having the deepest shadows picked out in a very attractive manner.

Silver intensifiers for dry-plates have generally been frowned down by photographers, in spite of the fact that no finer intensifier exists, nor one more simple in operation. For the last ten years I have steadfastly adhered to silver for intensification, and I see absolutely no reason for the neglect it has been submitted to. It certainly is not the careless man's intensifier, but, on the other hand, its use entails no greater care than the conscientious worker expends on all his photographic operations. The negative most suited to intensification by silver is one fully exposed but rather lacking the opacity necessary to give a vigorous print ; under-exposed negatives can never be successfully intensified with silver, and considerable over-exposure is best re-adjusted by treatment with an intensifier of the character of Monchoven's cyanide of silver.

For the encouragement of anyone inclined to adopt the silver intensifier, I give my own formula and method of procedure :—

A.	Hydrokinone	..	..	..	..	200 grains.
	Citric acid	..	..	..	..	200 grains.
	Distilled water	..	..	..	..	20 ounces.
B.	Silver nitrate	..	..	..	..	200 grains.
	Nitric acid	..	..	..	..	50 minims.
	Distilled water	..	..	..	..	20 ounces.

Take equal parts to intensify, which operation should be conducted either by gaslight or in very subdued daylight. After intensification the negative is rinsed and placed in a 10 per cent. solution of sodium chloride for some minutes, then in the fixing bath, as used for negatives, for a similar period. I have, experimentally, with the above intensifier

built up an image from the merest ghost to full opacity without the least staining of the film, although the operation occupied some forty-five minutes. The amount of nitric acid given should not be exceeded, otherwise the operation will be protracted and frilling induced. I attach the greatest importance to the thorough fixation of the plate before commencing to intensify, and it is probably due to the fact of my using two fixing baths that I have never come to grief when intensifying with silver.

There is no reason to suspect the permanence of negatives intensified with silver, though my own use of it does not go back further than ten or twelve years. If stains and subsequent deterioration make their appearance it is due to faulty manipulation and not to the employment of silver. Finally, in favour of silver intensification, we have Sir W. Abney's statement that a good silver intensifier is the great desideratum in gelatine work.

PROVERBIAL PHOTOGRAPHY.

MARTIN TUPPER SECUNDUS.

Beware the burglar who burgleth by night, and the local druggist who chargeth thee a bob a pound for hypo

When thou seest a Salon man, avoid him as thou would'st the plague, for he worketh confusion. Thou shalt not call him a photographer; he is a fluffy pinhole without form and void.

The president of Ye A.M.S. is like unto Mrs. Harris, of whom it is written, "There is no sich pusson."

Care will kill a cat; so will mercury in solution, if he be mug enough to drink it.

When thy printer breaketh a negative upon which thou hast set thy heart because of its beauty, thou mayst reasonably use words which would raise the roof of Billingsgate Market. For ordinary studio purposes a weak solution of gum dammit will suffice:

It is an idle excuse for a man to plead that he killed his grandmother so that her spectacle glasses could be used for fuzzygraphs. Verily it shall not avail him at ye Old Bailey.

Do not be hasty in destroying a fogged or spavined negative; it may win thee a medal if thou sendest a print from it before the right judges.

Ye red lamp at ye back of ye railway train is as ye sun in ye photographic dark room; but when thou removest it from ye train let no man see thee do it, or ructions will encompass thee.

There is a cup which cheers, and a cup which inebriates; there is another cup which sends you home—its name is cyanide.

If thou seest a pool of mud in thy road, curse not the neglectful scavenger until thou hast photographed it, and crowned thy picture with a cloudy sky. Thus shalt thou call it—"In the gloaming," or "Where the bee sucketh not." It shall win thee a medal.

Ye thrifty amateur if he have bought a job lot of bad pyro at ye auctiou mart, will borrow a better sort from his friends, and pay them back with that which he has purchased as aforesaid. So shall his negatives prove better than theirs.

When ye wind disarrangeth ye focussing cloth, use not unseemly expletives, for ye wind careth not one little "d" for all your storming.

When thou seest ye flash of lightning coming, fetch thy quickest shutter, for the lightning tarrieth not.

SOME PRACTICAL NOTES.

By EDMUND J. MILLS, D.Sc., F.R.S.

BACKING.

Backed plates are a necessity for many kinds of work. Ordinary plates are usually backed with a mixture of caramel and burnt sienna, or dextrine and red ochre, laid on with a brush. I have had in my hands a number of plates so backed; the brush marks are very visible on the back, and their traces often appear in the negative. This is due to the coat consisting really of streaks and interspaces. A better way to lay on a coat is with a sponge, very lightly applied; the coat to be afterwards rendered uniform with a roller squeegee or (in the large scale) lithographers' nap roller.

Among the best of the red coatings is certainly that of the "isolar" plate, which is between the sensitive film and the glass; the film itself is stained yellow, to prevent lateral spread of the image. The negatives produced on these plates are extraordinarily clean and brilliant.

For isochromatic plates, it is clear that one cannot logically avoid a black backing. I do not see why a backing of this kind cannot be placed between the film and the plate; there are, one would imagine, plenty of soluble blacks of sufficient visual transparency (if that were considered essential). Caramel backing lets through far too much of the red. Under these circumstances, no other resource is open to us but to make a black backing. The following is the composition of one that I have found very satisfactory:—White dextrine, 2 parts; American gas black, $1\frac{1}{2}$; white scentless Castile soap, 1; glycerine, $\frac{3}{4}$; water, 5. Boil the water, add the glycerine and dextrine successively; stir till dissolved. Then add the soap gradually in thin shavings, stirring all the time. Remove from the source of heat; pour on a little methylated spirit, and stir in the gas black rapidly. Squeeze through muslin. The preparation is liquid at first, but after a few days stiffens to a pap, and is then in capital condition for laying on. Only a very thin layer is required. It dries as soap dries, and is neither brittle nor sticky; nor does it crack with heat; it can readily be removed with a wet sponge. American gas black can be obtained at many dry-salters; in its absence, lamp-black, that is *not brown*, will answer. One method of dispensing altogether with backing is to use a film on a white paper support, such as the Wellington film. A dull black or

red paper would probably answer much better; for on certain slants of light, the grain of the paper reflects into the film, and shows strongly in the larger portions of the negative where there is little detail. It is much to be wished also that the emulsion were isochromatic. The paper backing is undoubtedly a perfect cure for halation.

By the way, Mr. Rippon's suggestion in last year's ALMANAC (page 1003), to mount and dry these negatives paper side downwards, is a very good one. Cardboard, however, which he recommends, curls too much, and cannot be used more than twice; slate answers much better.

URANIUM TONING.

As stated last year, uranium-toned positives are perfectly permanent if varnished. I find a 5 per cent. solution of white dextrine, containing a trace of glycerine, answers well for various paper prints. These having been washed after toning, are soaked five minutes in the dextrine solution, drained, and dried. It is worthy of notice that dense deposits of silver do not take uranium toning at all. The remedy is, to convert them into chloride and re-develop with a developer of the amidol class; toning can then be done easily.

CARBON PRINTING.

When the print is laid down on its support, care must be taken as to the water in which it is immersed. Common tap water is colder than the room, and contains a good deal of air in solution. When it meets with the warmer air of the room, it is, of course, disposed to give up air at its surface; this is the source of the bubbles so frequently observed. The remedy is obvious. Add to the tap water in the dish enough boiling water to make it a little warmer than the room, and beat up the mixture well with the open fingers. The whole will now be cooling down, and, of course, disposed to take up air at its surface. I am tempted to give these details, because I have not observed them in books on carbon printing. For many years I have not met with air bubbles, if working in this way.

VARNISHES.

A very cheap and extremely useful varnish can be made by dissolving gum kauri (New Zealand copal) in cold acetate of amyl. Good proportions are the following:—Gum, 4 parts; acetate of amyl, 28; oil of lavender, 1. Lavender oil is useful to neutralise the unpleasant smell of the acetate, and gives the necessary vivacity to the mixture; it is added after solution. The varnish is properly "aged" in about a week. If it dries in little ridges, add more acetate. This is probably the best of the cold varnishes. It dries up very rapidly, and leaves behind it a film of great hardness, and very high melting point.

NOTES ON TONING BROMIDE PRINTS.

By "ONS."

During some investigations connected with toning bromide prints I encountered some curious and at times unexplainable results, but which, on closer examination, appeared to point to an interesting fact

—viz., that the developer that had been used in producing the print had a certain influence over the final result of the toning operation. On closer investigation, this proved to be a certainty at least with a few developers, but I am unable at present to offer any explanation as to the reason, although the result would be expected if the developed image was composed of combinations of silver and oxidation products, but the fineness of the silver deposit, which varies with every developer, may also have something to do with this. Taking first the most permanent method of toning—viz., with hot hypo-alum, totally different results are obtained with different developers, amidol giving the best result, although synthol and ferrous oxalate are almost as good. but prints developed with hydrokinone-metol do not tone to a good sepia, even if they tone at all, which is often the case.

Ferrous oxalate is unsuitable for producing blue tones with the iron oxalate bath, hydrokinone giving the best results. In uranium toning, metol-hydrokinone and metol are very unsatisfactory; amidol causes stained whites, hydrokinone alone gives a good red-brown, ferrous oxalate a foxy-red, and both are satisfactory. In connection with this a number of tones can be obtained, ranging from sepia to foxy-red, by altering the proportions of acetic acid and pot ferricyanide, the more acid the redder the print. Fergusson's copper ferricyanide bath gives the best result with amidol; metol and hydrokinone alone or mixed are very unsatisfactory. Green toning by uranium, followed by iron, gives the best result with amidol.

The above very incomplete notes may be of use to those who have been unable to produce satisfactory results on bromide paper; but another very prevalent cause of failure is the quality of the water used in washing the prints after toning; a hard water causes very rapid deterioration in the tones of prints toned in uranium or iron; alum should also be avoided when prints are to be toned in these last baths, otherwise if it is used deteriorated whites are to be expected.

PHOTOGRAPHING INTERIORS.

By R. A. HAMBLIN.

The great secret in photographing interiors is to use backed plates and to expose fully—given, of course, a suitably lighted subject and a fairly good lens. No amount of care in the photographing will make a picture out of a badly-lighted, ill-chosen subject presented by a lens of defective covering power. Pictures are numerous enough to the practised eye in any ordinary interior, whether domestic or ecclesiastical, and it is far easier in than out of doors to determine what will “photograph,” the distracting colour factor being to a large extent absent. The photographer should aim at little “bits,” not comprehensive views, which are almost always hideous, owing to the strained perspective brought about by the attempt to include too much on the plate at close quarters. Besides, most interiors of a certain class are much the same in general design,

and a series of views of these would quickly become most monotonous. The writer knows an amateur who makes a speciality of country churches whose photographs are mere duplicates one of the other. They all present the church from the middle of the centre aisle, with an equal number of bays on each side, and the east window bang in the centre of the plate, and, of course, are neither pictures nor useful records.

Before setting up his camera in a church the photographer should first take a stroll round the inside, half closing his eye at intervals, so as to get a general idea of the distribution of the lights and shades, and keeping a lookout for little clusters of arches or groups of pillars, etc., that compose well. When he has pitched on a suitable bit, there comes the difficult job of focussing and arranging the camera to the best advantage. Difficult, we say, advisedly. There are the tripod legs slipping about the polished floor in all directions, while our frantic endeavours to get the camera to remain tilted at a particular angle usually end in a total collapse of the perverse instrument the moment we take our hands off it; or, perhaps, when we are drawing out the shutter of the dark-slide the whole thing swings round out of position. Then, in focussing, by straining our eyes to the utmost we can scarcely see anything at all on the screen, and it is utterly impossible to tell whether the image is sharp or not, and we are not quite certain what we have got in, and whether we are using the swing-back and the rising-front to the best advantage. All these difficulties and many others beset the average tyro when he essays to photograph an interior, but a very little experience will show him how to triumph over them. Let us watch an "old bird" at work. In the first place, the old bird comes provided with three little squares of india-rubber or cork in his pocket, which he sticks on the spikes at the end of his tripod, or, if he has forgotten the corks, he borrows three hassocks from somewhere, or perhaps an old bit of carpet—anything rather than the naked stone floor. Then watch how he places his tripod legs for convenience in tilting the camera. The one behind and the two in front. If the interior is very dark and focussing difficult, he will get someone to hold a lighted match in various parts of the picture and focus on the flame. As a rule he will use the swing-back as little as possible—the rising-front will be used to cut off the foreground, and then, if not enough of the upper part of the building is included, he will prefer to elevate the camera bodily by means of more hassocks or by three chairs—focussing operations being directed from a fourth chair. The old bird does not choose a view in which there is a brightly-lighted window standing out against deep shadows. He knows that even a backed plate is not proof against halation in such cases. To this end, in photographing in a church, he will get most of his views looking north, the light in a church during the daytime coming mostly from the south windows. He uses as large a stop as his lens will permit and gives a full exposure. It is practically impossible, with an ordinary man's patience and time, to over-expose an interior. As a rule the worker wants to put on the cap long before the plate has "had enough." Any time from five minutes to as many, and more, hours may be given. The ordinary church interior with a plate of medium rapidity and $f/32$

requires about twenty minutes, but this is a very rough guide. Here again we note a peculiarity of the old bird. He does not remain in fear and trembling behind his camera, all the time of the exposure, but boldly wanders round in front, examining any interesting points in the building and keeping his eye open for fresh pictures, knowing full well that a moving object makes absolutely no impression on the plate during a long exposure.

Developing interiors is an operation that requires some little more attention than that bestowed on the development of an ordinary subject. The writer advocates pyro-soda diluted to half the normal strength. This is very slow in action, but it produces gradation and detail, which are the things in an interior; contrasts usually come without any special seeking after them. The developing-dish should be shaded from the light, and the plate only examined at intervals of, say, three minutes.

THE USE OF A CONVEX LENS IN PRINTING.

By T. PERKINS.

It is probably well known to most photographers that when any part of a negative, owing to over-density, refuses to print, the detail may be brought out in the print by concentrating the sun's rays upon that part of the negative by means of a convex lens—the “burning glass” of our childhood with which we used to light matches or slips of paper. Care, of course, is needed; it would not do to use a large glass and focus the sun's image accurately on the negative, or the heat might be, should the sun be hot, so great as to crack the negative or injure the paper on which the print is being made; but by holding the glass so that the distance from it to the negative is less than its focal length, an out-of-focus image of the sun is formed, which, though considerably lighter than the sunlight which would fall on the negative if the glass were removed, yet will not be sufficiently powerful to injure the negative or print: by moving the lens nearer to and further from the negative, the disc of light is increased or diminished in size, and by thus keeping the lens in motion hard lines in the print are avoided.

It is my usual habit when employing this method to print the picture in the ordinary way first, and put in the finishing touches by means of the lens; but a short time ago, as there were only occasional glimpses of sunlight, I had to use the lens at such times as the sun shone, irrespective of the stage at which the print had arrived. I was printing a portrait, in which the face required a longer exposure to light than the dark background and black clothes, which arrived at the bronzed condition before the face was sufficiently printed; I therefore took a $3\frac{1}{4}$ in. telescope objective of about 4 ft. focal length, and, holding it from about 18 to 24 in. from the negative, forced sufficient half tones into the face. Once the sun came out from behind clouds, just as the paper (platinum) had been put into the printing frame, and I used the lens at once. After a minute or so, I examined the print, and found it in such a condition that had

I developed it without any further exposure to light, I should have obtained a delicate vignette.

The result, thus accidentally arrived at, suggested to my mind the possibility of producing vignettes with great rapidity by this means. It would be well to provide oneself with a double convex lens of 3 to 4 in diameter—any cheap one would do quite as well as the high-class telescopic object-glass I used—and fix it into a sheet of thick cardboard, in which a hole, the same size as the lens, had been cut. The fixing can easily be done by cementing a ring of thick paper on either side of the cardboard, holding the lens between them and preventing any rays of light finding their way round its edge. The cardboard itself would then prevent any direct light, save that which passes through the lens, reaching the print. The board can be held in the hand and moved as required.

By use of this simple piece of apparatus, not only can vignettes be made, but various effects introduced into the print. The disc of concentrated light may be made to fall upon, or to travel over any part of, the negative desired, clouds may be made to print more strongly, lights may be reduced, and shadows deepened. Thus the resulting print will be marked by the individuality of the photographer, and not be a mere mechanical production. Platinum paper seems most suitable for use in this way, and the best time for such printing is a cloudless day, at an hour when the sun is somewhat low, as the heat from a blazing mid-day summer sun might do mischief.

DEVELOPING HAND-CAMERA EXPOSURES.

By P. J. SLATER.

When developing hand-camera exposures, we may safely presume that the majority of them are more or less under-exposed. It is, therefore, desirable to adapt a developer, and a method of development, suitable for plates or films which have received a brief exposure. Perhaps there is no developer more suitable for the work than pyrosoda. This, at least, is my own opinion, which is founded on experience. I occasionally use other re-agents than pyro, but none give me better results. I invariably use it without bromide when developing snap-shots, keeping the proportion of pyro low, using a full amount of soda at first, and diluting the whole with an equal quantity of water. The dish should be kept covered during development, which will take much longer than ordinary time exposures, giving a greater chance of fogging through using a light not absolutely safe. By keeping down the pyro at the start a chance is given for the detail in the shadow portions to make its appearance. If, when the detail appears fully out, the negative appears thin and flat, a second lot of developer, stronger in pyro, and with a few drops of a 10 per cent. solution of bromide should be applied. Many workers object to the use of pyro, on account of its staining properties. This I find rather an advantage than otherwise, but to those who prefer clean, blue-black negatives, a mixture of metol and hydrokinone is not to be beaten. I always prefer a simple developer, and find the following

formula to be excellent, giving soft negatives, full of detail:—No. 1 solution: Metol, 16 grains; hydrokinone, 12 grains; sodium sulphite, 1 ounce; water, 10 ounces. No. 2 solution: Carbonate of soda, 5 drachms; water, 10 ounces. To use, mix in equal parts.

THE TONING OF P.O.P.

By THOS. STOKOE.

In thinking over what response I could make to the Editor's request for a short practical contribution to his forthcoming annual "Magnum opus," I have remembered how frequently one sees in the "Answers to Correspondents" columns replies to inquiries as to the cause of variation in the tones of finished prints, but I do not think that sufficient attention has been given to the temperature at which toning is carried on. In the case of the combined toning and fixing bath, compounded of hypo, sulphocyanide, and gold chloride, I have found this matter of temperature of the utmost importance, and, by systematically working with the solution at from 65 degrees to 70 degrees, I can secure successive batches of prints, finished with scarcely any variation in colour. In order to secure about this temperature with little trouble I keep my solutions in the cellar during the hot weather, and tone in the evening or early morning, a course which has only been necessary for a few weeks this year; in ordinary temperate weather they are kept in the work room, and in winter I warm the dish with hot water before pouring the solution into it, experience soon teaching to what extent the dish should be warmed. After pouring the solution into the warmed dish, time should be allowed for the transfer of the heat from the dish to the liquid, otherwise a print coming in contact with the dish would be softened, and the gelatine surface would be liable to receive damage.

A CAUSE OF FAILURE IN INTENSIFYING WITH SILVER.

By H. J. CHANNON.

Fashion is a great power in photography, as in other things, and we have an instance of its influence in the fact that the means adopted for intensifying negatives have now come to be limited almost entirely to the employment of a few varieties of mercurial processes, which are certainly dangerous, from the poisonous nature of the chemicals employed, and are not free from serious practical defects. Very many methods of intensification have been described or suggested from time to time, and have generally been passed over and set aside without having a fair trial, or, in fact, any trial at all, for the old method holds the field and must not be disturbed. Still, these alternative methods have their advocates, and it is desirable that those among them which promise to add to our resources should not be overlooked. Among the more promising of the suggested processes must be classed some of the forms of physical re-development by the reduction of salts of silver, the method almost universally employed in the days of collodion,

and which has been successfully applied to gelatine, and its use strongly advocated, by some of our most celebrated and skilful photographers. Lately, I notice, physical intensification has again been strongly recommended, and it is that which leads me to write a few words on the subject.

Now, there has always been a certain amount of mystery about this process, because, while some workers have found in all respects most satisfactory, in other hands it has proved, always, and in all its forms, practically unworkable. I must confess that it is in the latter class of workers that I must be included; every attempt that I have made in intensifying gelatine negatives in that manner, although I may have followed most carefully the directions of writers in whom I had perfect confidence, has resulted only in the production of deplorable fogs and stains and the ruin of the plate. Evidently, there must be somewhere a grave difference in our methods of working, and I think I may now possibly be able to suggest an explanation.

In an extremely interesting paper, which he read at the meeting of the Royal Photographic Society, of 19th April, 1898, Mr. J. Sterry showed that if an exposed plate be fixed without development, a latent image remains, which cannot be made visible by treatment, either with an alkaline developer or with the mercurial intensifiers; but, by means of physical development it may be brought out with great vigour, and given, if required, almost unlimited density by continuing the action. Evidently, then, an ordinary negative, which had been exposed to daylight, between development and fixing, would contain an invisible something over all its surface, which, while producing no evil effect, if the plate were intensified in the more usual manner, would result in dense fog all over, should physical intensification be attempted. And this matter of exposing the plate to light before fixing is one in which there is great difference in the practice of photographers. Mr. W. K. Burton long ago expressed the opinion that, after thorough washing, it was a perfectly harmless proceeding, and my experience has always supported that view; for, being anxious to keep the thiosulphate out of the dark-room, I have always fixed my negatives outside, and never detected the slightest deterioration, as resulting from the action of the light. This practice, however, fully explains in my case the failure of the physical process of intensification, and possibly may account for many of the failures which have occurred in other hands. Whether it can be regarded as in general, the sole cause may be doubtful, but it is at least fairly certain that success is impossible unless the negative has been fixed in the dark-room.

THE USES OF A POCKET COMPASS WITH THE CAMERA.

By J. TILFOR.

It has often surprised me that a compass is so seldom seen in the hands of a photographic tourist. If a note were always taken of the direction in which the camera was pointed when taking a view, with the date and time of day, and all cloud negatives similarly marked, we should not so frequently see printed-in clouds differently lighted from the other parts of the picture.

It is, I believe, the custom of many tourists, like myself, to select subjects in the evening for the morrow's work. A compass will show at what hour of the day such subjects will be most suitably lighted.

Then, apart from purely photographic reasons, the compass will be found of great utility, with a good map, in finding your way in unfamiliar parts of the country.

An instrument should be chosen having the needle attached to the card, like a ship's compass, with the northern half of the card black. This will enable the direction to be seen in a feeble light.

VARYING THE SURFACE OF PRINTS.

By A. LOCKETT.

A fact which is rather useful to know is that a glossy print of any kind, mounted, may be transformed into a matt surfaced one by rubbing with fine pumice powder. The method is as follows:—The mounted print being laid on something flat, the pumice powder, which must be the finest obtainable, is sprinkled liberally all over it, and is then rubbed on the print with a circular motion, with the fingers or a soft pad of wool. This must be done gently and gradually, dusting the powder off occasionally to inspect the result. With reasonable care there is no need to spoil the mount in the least, and the print will be found to take a most artistic matt surface. Very often a print on ordinary P.O.P., which has been damaged or splashed in some way, have have the defects entirely removed and be converted into a far more pleasing picture by this means. Prints on glossy P.O.P., toned to a warm red, and treated in this manner seem to possess a certain charm of their own, quite different to what would be obtained by a print on matt surfaced paper in the usual way. There appears to be a general softening of outlines and a gain in breadth and atmosphere, as it were. The only fault to be found with this method is that the surface so obtained seems very liable to injury from damp or scratches, and must be treated with care. It, of course, goes without saying that before any print can be rubbed with pumice powder it must be thoroughly dry.

EPITOME OF PROGRESS IN 1902.

COMPILED BY THE EDITOR.

THE TRAIL TAYLOR MEMORIAL LECTURE. ZONAL ABERRATION AND ITS CONSEQUENCES.

By SILVANUS P. THOMPSON, D.Sc., F.R.S., F.R.A.S.

Great as have been the advances in geometrical optics during the last quarter of a century, they remain for the most part outside the general run of text-books of physics or even of optics, unknown or ignored. Various causes have contributed to this neglect or ignorance on the part of those who write these text-books. Amongst them may be named the examination-blight which, like the phylloxera, has poisoned the healthy growth of science; the inept tutorial system of the older Universities, which is a prime factor in discouraging research; the fact that many of the recent optical advances have been made by men not of our own nation, and whose memoirs are written in another tongue; and lastly, the significant circumstance that these advances have almost without exception been the result of the technical applications of the science, the consequence of a recognition of practical needs in the manufacture of the microscope, the telescope, or the camera, and therefore outside of the range of the paper science alike of the text-book writer and of the University tutor.

In no department of geometrical optics has the advance been more marked than in the study and treatment of aberrations of lenses. The demand of the astronomer for improvements in the telescope, of the biologist and histologist for improvements in the microscope, of the photographer for improvements in the camera, have successively compelled the study of aberrations from different standpoints. For the telescope the removal of chromatic aberration in the first place, and of central aberration in the second place, were almost sufficient. For the microscope a more complete achromatisation was not in itself sufficient; it was necessary also to strive after flatness of image and avoidance of the aberrations due to diffraction. For the camera something more was needed. Achromatic performance was certainly desirable, and so was flatness of field; while diffractive aberration was relatively unimportant. Yet in the camera it no longer sufficed to correct the lens, as in telescopes, for central aberration only. It was necessary to take steps to secure marginal definition as well as central; to give that definition over a wide angle of view; to avoid distortion of the image in its own plane; and—most difficult of all—to fulfil all these conditions while having a large aperture relatively to the focal length. This last require-

ment, as is well known, is the condition for admitting a large quantity of light so as to make the lens rapid in its action. If only the lens might be stopped down to a very small aperture almost all the aberrational difficulties vanish of themselves. But if rapid performance (that is with a wide aperture) and accurate performance over a wide range of field are set down as primary conditions to be fulfilled, then the aberration difficulties can by no manner of means be disregarded or shirked. The simple cures that sufficed a century ago for the telescope—and they are all that the paper-science of the text-books deigns to acknowledge—are wholly inadequate. Under the new conditions new forms of aberration, insignificant under the old conditions, force themselves into view. Their removal cannot be effected without deep study of their cause, and clear insight into their nature. New designs of lenses must be thought out and tried; and even to-day the design of such lenses is as much a fine art as a science: it is the art of optical compromise; the art of attaining a good working lens by setting some of the inevitable aberrations to balance the others; the art of attaining sufficient perfection in some one respect by deliberately sacrificing perfection in some other direction.

Amongst the aberrations which have thus asserted themselves in the case of camera lenses, that is to say, which have asserted themselves because of the necessity of using lenses of wide aperture and at the same time of letting light go through them very obliquely so as to take in a wide angle of view, there are two that have not even been mentioned in the foregoing brief review. These two are *zonal aberration* and *radial astigmatism*.

Zonal aberration makes itself known by producing the effect called by photographers *coma*. This defect is easily described and shown. Take any ordinary positive lens—say, a plano-convex—and cause it to form an image on a white screen of any small, bright object, such as a small glow-lamp, placed not on the axis of the lens, but away at one side of the field of view. The image will be found to be distorted into an ovate, or pear-shaped, or comma-shaped blur, from which the origin of the name *coma*. The zonal aberration which is the cause of coma will be the principal topic of the present lecture.

Radial astigmatism is also an aberration which besets the oblique pencils of light. If a lens have this defect, the margins of the image which it throws on the screen will be blurred, every bright point in the marginal region being turned into a little streak; with the peculiarity that if the focussing screen is too near the lens, these streaks will all be set tangentially around the centre of the picture, while, if the focussing screen is too far from the lens, the streaks will all point radially towards the centre. The simple fact—studied by Airy, Coddington, and Herschel sixty years ago—is that any and every lens not specially corrected for this defect, even if corrected for chromatic aberration, for central aberration, and for zonal aberration, does not bring an oblique or “secondary” beam stigmatically to focus at a single point, but so acts on it as to produce two focal lines, lying in space at different distances from the lens, the first (or nearer) focal line being situated tangentially with respect to the axis of the lens, and the second radially. In other words, the oblique pencil is no longer homocentric. It still follows or surrounds its central oblique axis, but the rays from above and below meet one another at a different distance from the lens from that at which the rays from right to left meet one another. It is the aim in all the modern so-called “anastigmatic” or “stigmatic” lenses to get rid of this defect of astigmatism, the lens being designed so as to merge these two focal lines into a single focal point. This phenomenon of radial astigmatism is fairly

well known, though some authors, by merely calling it "astigmatism," cause confusion, since astigmatism proper is the defect due to cylindricality. The many authors who have written on photographic optics during the last forty years, Petzval, Bow, von Seidel, Monckhoven, and, by no means least, the late Mr. Traill Taylor, have dwelt much on these astigmatic phenomena. There is, therefore, no need to emphasize them here; but, inasmuch as coma and radial astigmatism are both of them aberrations which beset oblique pencils, they usually coexist and need to be studied together. Nevertheless, they are essentially two different phenomena, arising from different causes, requiring separate consideration, and needing different remedies. If both defects are present in any lens, then in no position of the screen will the two focal lines appear as strictly lines, but will be ovate patches, or, in some cases, shaped like elongated figures of eight. If zonal aberration has been really corrected, the two focal images will appear in narrow, well-defined, short lines.

The name *zonal aberration* is intended to imply an aberration which results from the various zones of the lens being of different power, producing unequal magnification. To make clear the point in issue, let us admit two preliminary suppositions:—First, that chromatic aberration does not exist in the lens in question. To fulfil this condition we must either suppose some perfectly achromatic construction, or else that only a monochromatic light is employed. Secondly, let it be granted that central aberration (commonly called in the text-books spherical aberration) has been removed. In other words, it is assumed that, by the choice of a suitable figure, Euler's condition has been fulfilled, and that, for a parallel beam of light incident axially, the lens produces perfect concentration at the principal focus. This is only another way of saying that, if the lens has been corrected for spherical aberration, all its zones agree in having the same principal focus.

Now we have got to make it clear that a lens which is so far perfect as to fulfil these two conditions—a lens which in common parlance is free from both chromatic and spherical aberration—can yet suffer from coma. In the first place it does not at all follow that the elimination of spherical aberration at the principal focus will ensure perfect definition of focus at any other point. Consider only points on the axis. To every point on the axis where an object (a bright point) might be placed, there corresponds a conjugate point where its image will fall. Now it is possible, by choosing an appropriate figuring, to correct the lens spherically for any one such pair of conjugate points, but not for more than one. In the ordinary telescopic case, the object is practically at infinity, and the image at the principal focus. But if spherically corrected for this case, there will be spherical aberration if that lens is used for any other case, as, for example, to produce an image of a bright point situated, not at infinity, but at a distance equal to only two or three times the focal length. Again, considering for the moment those points only which lie in the principal focal plane, though the central one (the principal focus itself) is devoid of aberration, it by no means follows that the others will be. The ordinary correction for what is called spherical aberration, though it may somewhat help the definition for oblique parallel beams, is strictly a correction for a principal beam only, focussing centrally. That is why, to avoid misunderstanding, I have spoken of such a lens as one corrected for *central aberration*.

But, it may be asked, if a lens is by hypothesis such that it has the same principal focus for all its zones, from centre to edge, how can it yet suffer from zonal aberration? Remember that I have

described zonal aberration as consisting in this, that the various zones of the lens are of different power, producing unequal magnification.

Here I must be allowed a short digression to make clear a point, familiar enough to all students of the recent developments of geometrical optics, though too little recognised in the belated optics of the text-books, that there is a difference between the apparent focal length of a lens and its true focal length upon which its power depends. Two lenses may, for example, have their respective principal foci at equal distances from the back surface of the lens, and yet they may magnify quite differently. Every photographer knows that his camera objective, which has a principal focus at, say, six and a half inches from the surface of the lens, will not produce a picture of the same size as a thin lens of six and a half inches focal length, but will probably act more like a thin lens having a focal length of eight inches. In the theory of Gauss, which deals with the theoretical properties of an ideal lens, never realised perfectly in practice, this difference in magnifying power between two lenses that have the same apparent focal length is explained by a geometrical artifice; the refraction exerted by the lens upon a given ray parallel to the principal axis being referred back to an imaginary surface which in Gauss's theory is considered always as a plane and called a "principal plane" (*Haupt-Ebene*).

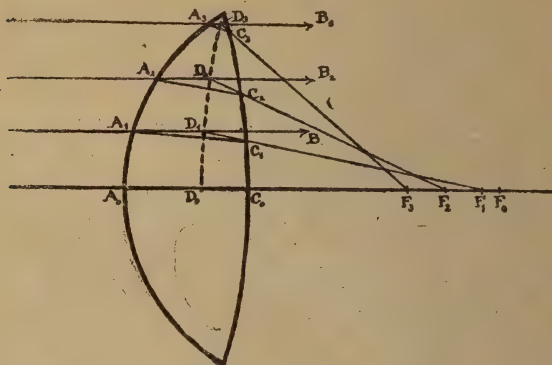


FIG. 1.

Thus in the diagram Fig. 1, in which the effects are purposely exaggerated, let a ray parallel to the axis enter the lens at A_1 , instead of emerging in the direction of B_1 , it is refracted first on entrance at A_1 , secondly on emergence at C_1 , so that it cuts the axis at F_1 . Let now the final part of the ray F_1C_1 be produced backwards, until it meets the line A_1B_1 in the point D_1 . The lens, in fact, produces on this particular ray the same effect as if the light had gone straight on from A_1 to D_1 , and had then abruptly turned from D_1 down to F_1 . Now, if the same construction is made for a number of rays which meet the lens at different distances from its axis we obtain for each its own point D . The surface in which all these points lie is the "principal surface."

It obviously passes through the outer edge of the lens, since at the edge the points A, c, and D, come indefinitely near together. The form of this surface will obviously depend on the curvatures of the two faces of the lens; there will also be in every lens two such surfaces, one for a parallel beam in one direction, the other for a parallel beam in the other direction. It is also obvious that to assume, as Gauss did, that in every lens each "principal surface" is always a plane, is very far remote from actual facts. With this diagram before us let us consider anew the problems of aberration. Remember that we are considering chromatic aberration to be absent; or that the light that is being used is monochromatic. In the first place if the effect of the various zones is to produce (as shown) different points of intersection with the principal axis at F_0 , F_1 , F_2 , etc. there is present the defect of central aberration, commonly called spherical aberration. If the lens has been proportioned according to the well-known rule of bending over the curvatures of the faces so that the curvature of the first face is about six times that of the second, then this central aberration will be a minimum for parallel rays, and the points F_0 , F_1 , F_2 , etc., will practically coincide.

But, even then it will be evident that though such a lens possesses the same focal point for all its zones, those zones are not necessarily all equal in their magnifying power; for they are not all at equal distances from the focus.

Only if the principal surface in which lies the points D_1 , D_2 , D_3 , etc., is itself a portion of a sphere concentric around F_0 , will each zone have the same *true* focal length as each of the others. In other words, if this surface is not a sphere, the size of the image at F of an object (for example, the disk of the sun and moon) will be different for different zones of the lens. The image due to rays that traverse one zone of the lens will overlap that due to the rays that traverse another zone; but they will not coincide accurately. This defect is that to which the name of *zonal* aberration is given.

If a lens, consisting of one piece of glass only, is corrected as well as possible for central aberration, it will not be corrected for zonal aberration, and *vice versa*; for the conditions are different. To correct both defects at the same time will require more than one piece of glass to be used. It is possible in the case of achromatic doublets, made of two different qualities of glass, to choose the four faces so that both central aberration and zonal aberration shall be approximately corrected.

Abbe has proposed to reserve the term "aplanatic" to denote lenses which fulfil *both* these conditions. Abbe has also shown that the elimination of zonal aberration is dependent upon the fulfilment of the so-called sine-condition.

As remarked previously, zonal aberration, if present, makes itself known by the effect called *coma*, the pear-shaped blur that does duty for focus for an oblique pencil; but the coma will be somewhat worse if central aberration is also present, since any want of definition in the focus of an axial beam is augmented if the incidence of the beam be made oblique, and it increases rapidly with the obliquity of the incidence. A plano-convex lens used for distant objects gives for oblique pencils an outward coma with its broader end streaming outward, if the flat face of the lens is turned toward the light. If then the convex face is turned toward the light it gives an inward coma.

It will be useful to devote some attention to the phenomenon of the coma itself, without troubling at first as to how far it is due to purely zonal, or how far to central aberration. Take any ordinary simple

magnifying lens; place it in front of a white screen; set beyond it a source of light that is approximately a point; let this luminous point be on the principal axis of the lens. By moving the lens toward or from the screen a position can be found—provided the source of the light is itself not too near to the screen—where the lens casts a focussed image inverted and diminished in size upon the screen. Assuming the lens to be perfect, the image of a point ought to be a point. But even an achromatic and aplanatic lens will not necessarily yield a perfect point-image at the centre of the field, because, though at the centre of the field *all* aberrations are less than at the margin, the lens can be made aplanatic only for one particular pair of conjugate points, which may not happen to be the pair occupied by object and image. That all aberrations are less at the centre of the field is due to symmetry in the conditions. If the object is displaced laterally, so that the axis of the incident pencil becomes oblique, the image moves away also from the centre of the screen toward the margin, and at the same time the various aberrations are increased. With any ordinary lens the most obvious effect is the elongation of the image into a pear-shaped, or comet-shaped blur, the *coma* to be discussed. Now this blur in the image formed thus obliquely cannot be got rid of by refocussing. Moving the screen nearer to the lens, or further away, may change its shape or the concentration of light in its parts, but will not cause it to contract to perfect focus at a point. Tilting the screen at an angle may also affect the form; but in no position of the screen will the image be rendered as a *point*. The simple fact is that the rays of the pencil that emerges obliquely from the lens are no longer homocentric. Covering the lens with a diaphragm pierced with a round hole, it will be found by moving it about that in certain positions it improves the definition of the image by cutting off the more aberrant of the rays. A little examination will show that the different zones of the lens are focussing at different points in space, and that in the case of all the outer zones of the lens the different parts of the zones are acting unequally owing to want of symmetry in the oblique incidence of the beam.

Instead of displacing the luminous object laterally we may more conveniently produce the same result by simply tilting the lens. If we tilt the lens 30° the effect is the same as if both object and screen had been moved through an equal angle with respect to the axis of the lens.

Setting a lens thus obliquely in front of a powerful source of light, such as an arc-lamp, we may proceed to study the zonal effects in several different ways. In the first place, we may stop off with opaque varnish some one zone of the lens, and observe the result upon the emergent beam of light. Or we may stop off similarly the whole of the lens except one single zone that is left exposed. Or we may affix against the face of the lens a *zone-plate*, made by painting concentric rings in black varnish upon a glass plate of equal size. Or, lastly, we may interpose diaphragms or other opaque objects in the path of the emergent beam, at points not in proximity to the face of the lens, but at some distance from it, and observe the shadows cast on a screen by such interposed objects.

Such experiments have been made in numerous ways with a number of different lenses, tilted at different angles, and with incident beams of varying kinds, some divergent, some parallel, some convergent. From these experiments a few are selected as examples.

ZONAL STUDY OF A PLANO-CONVEX LENS.—FIRST SERIES OF EXPERIMENTS: OUTWARD COMA.

The plano-convex lens used is one having a focal length of about 19½ inches, and a diameter of about 7½ inches.

A zone-plate consisting of a disk of thin glass, upon which were painted in black varnish concentric zones of equal width, was fitted to the lens. It was placed in front of an arc-lamp which furnished a divergent beam of light. It was arranged so that it could be tilted about its horizontal diameter to any desired degree of obliquity, and the beam which traversed it was explored by means of a white semi-transparent screen, set vertically, so that the axis of the beam met it normally. This screen was first placed in close juxtaposition to the tilted lens, and in this position the forms taken by the distorted annular patches of light transmitted through each of the several zones of the lens were delineated on the screen; tracings of their outline being preserved. The screen was then moved a short distance away, and another tracing taken. This operation was repeated at regular distances from the lens, the series of pictures of the aberrations due to the zones of the lens being thus obtained experimentally. The general arrangement is shown in Fig. 2.

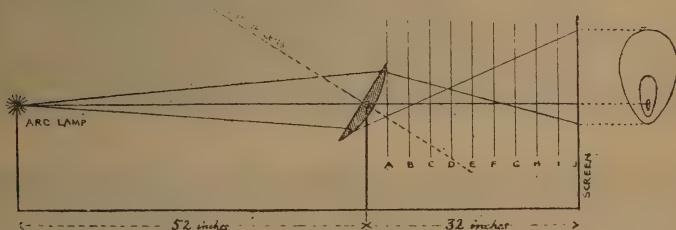
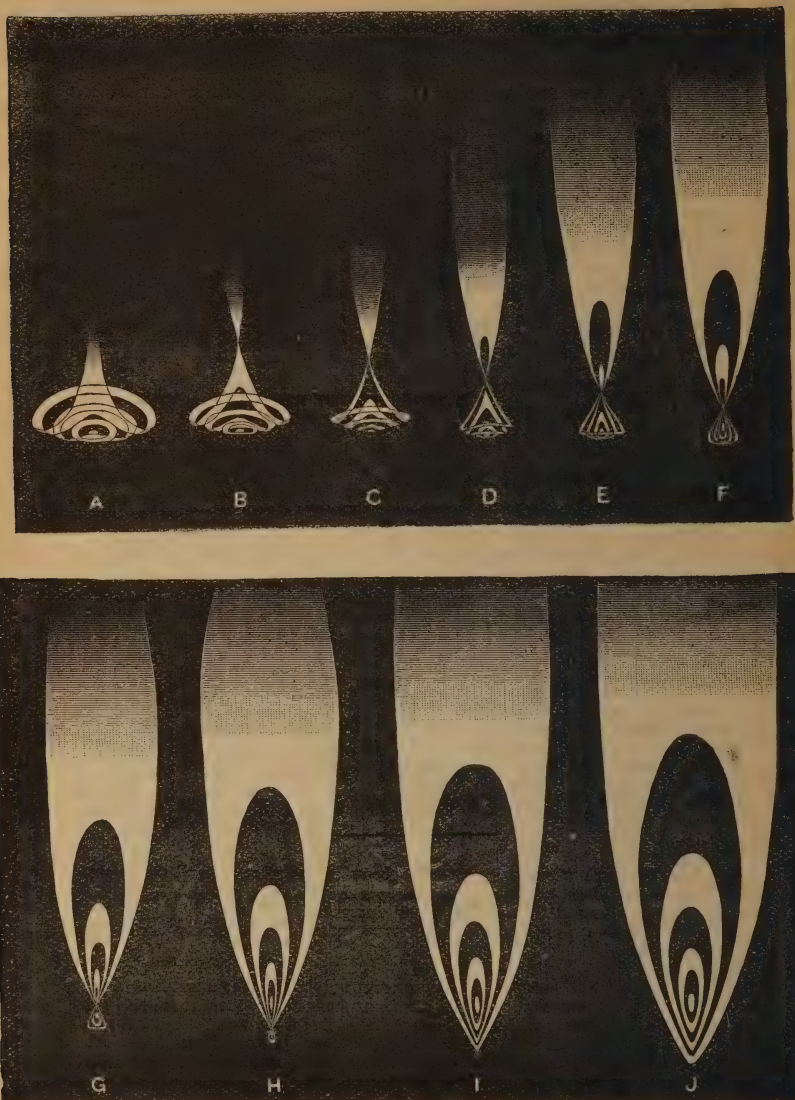


FIG. 2.

The flat face of the lens was toward the light, the distance being 52 inches. The lens was tilted over to about 45°, and the translucent screen to receive the tracings was shifted through successive distances of 8 centimetres or about 3½ inches. The ten figures so obtained are given on a reduced scale of about ½ in Fig. 3. The pattern, marked A in Fig. 3, is that received when the screen was nearest the lens. It shows that the lower edge of each zone is distorted upwards, the refraction at the lower side of the lens being the most extreme. The rays traversing the lowest portion of the outermost zone have, in fact, crossed those refracted by the uppermost part of the same zone. The successive modifications in the figures B, C, D, etc., can be followed out. The final pattern, Fig. 3, J, shows that the whole of the zones are now inverted; the part of the figure at the apex at the bottom being the light which has traversed the topmost part of the outermost zone. At no one position of the screen does the whole of any one zone focus itself at a point, or even in any focal line. The ray (or narrow pencil) through the central hole in the opaque zone-plate shows itself in all the series as an oval spot, marking the core-ray or oblique axis of the non-homocentric pencil. It is smallest and most nearly approaches to being a point in Fig. 3, E. In Fig. 3, C, it lies right below the rest



of the pattern. This corresponds to the position shown in Fig. 2 of the core-ray (horizontal in that figure) which at a certain distance beyond the lens lies lowest of all the rays; being there a tangent to the caustic curve formed by the intersection of the rays. Mr. J. Dennis Coales has constructed for me an ingenious model in which these rays are actually represented to scale by strings stretched between two vertical planes. This model was constructed by drawing full size on the two planes the outlines of the patterns A and J of the series, fixing them vertically at the proper distance apart—about 27 inches—and then joining, with strings the corresponding points. Section planes taken through the string-model at appropriate intervals would reproduce the intermediate figures of the series with precision. This series gives an example of outward coma.

SECOND SERIES OF EXPERIMENTS: INWARD COMA.

A second series of observations was made with the lens turned with its convex face toward the lens, yielding an inward coma. In this instance the lens was placed at $17\frac{1}{2}$ inches from the light, slightly nearer than its own focal length. On tilting the lens about 30° a more complicated figure (see Fig. 4) replaced the oval coma on a

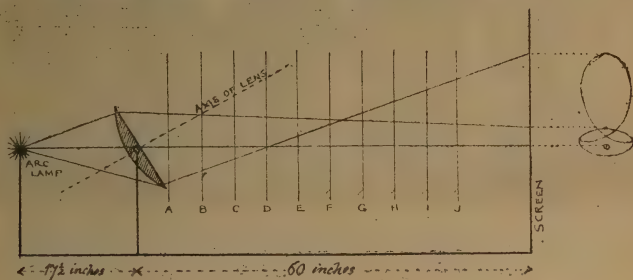


FIG. 4.

distant screen. A series of observations was then taken at regular distances of 10 centimetres (about 4 inches) apart, giving the forms which are reproduced in Fig. 5 in the series from A to J. In this case, the lens being somewhat less oblique the distortion of the zones proceeds less abruptly. The form of A shows the zones distorted, but not yet crossing one another. This distortion proceeds in a regular way, each zone successively buckling up and forming a loop at the top, while the upper portion of each zone descends and becomes the base of a quasi-triangle part, which eventually shrinks in and either disappears or bends upward into a second loop. The outermost zone, for example, on a screen 5 feet away, if the lens is not too oblique, turns into the shape shown in Fig. 6, in which the top of the upper loop is formed inverted by the rays through the bottom of the lens, while the top of the lower arched loop that crosses it is formed non-inverted by the rays through the top of the lens. The side loops are formed by rays coming through the sides of the outermost zone, and are non-inverted. On tilting the lens more obliquely the top of the arched lower loop descends and flattens, becoming of the same shape as the outline of Fig. 5, J.

The drawings in this series were made by Mr. F. I. Hiss in the manner already described. It will be noted that the details differ from those of the former series. There is more spherical aberration present.

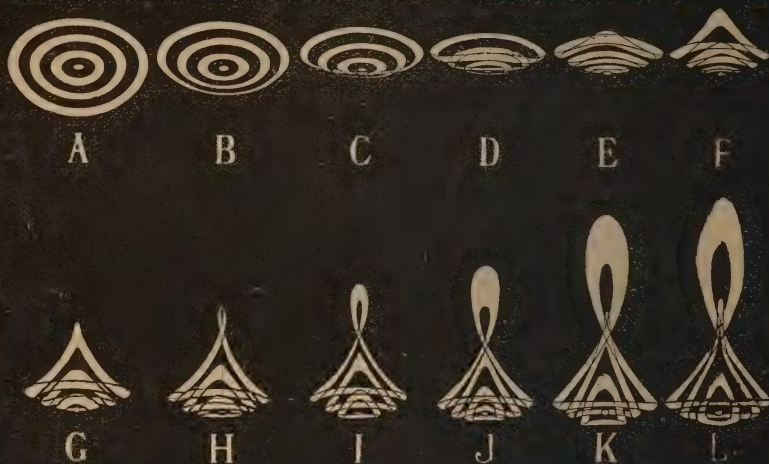


FIG. 5.

The lens was somewhat less oblique in this instance; and as the lens was a little nearer to the light than its own focal length there would not, if it had not been tilted, be a focal point at any position of the screen, the emergent beam being slightly divergent.

Your President has kindly placed at my disposal an excellent *Rapid*

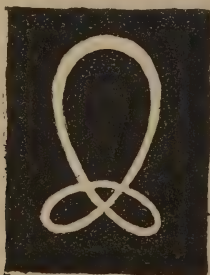


FIG. 6

Rectilinear lens, the well-known product of his firm, that I might make some observations upon it. I have preferred to avoid any possible controversy by taking a lens which preceded the introduction of the modern anastigmatic type. This lens however disappointed me by proving itself to be remarkably free from zonal aberrations. They can, indeed, be found by fixing a zone-plate over either face of the lens. But that is hardly fair. It enabled me to study the effect of the zones of one component as acted upon by the whole of the other component. Accordingly I made a small diaphragm with zones, which could be slipped into the middle in the place where the usual stops are placed. With this disposition the curves were obtained which are shown in fig. 7. If the lens was accurately focussed on a celluloid screen, and then tilted right and left, the series of aberration-figures was that shown in the middle line of fig. 7. When the screen was shifted 2 millimetres nearer to the lens, the curves changed as shown in the upper line. When the screen was shifted 2 millimetres away from the lens the curves were those of the lowest line. The latter show a nearly pure astigmatism.

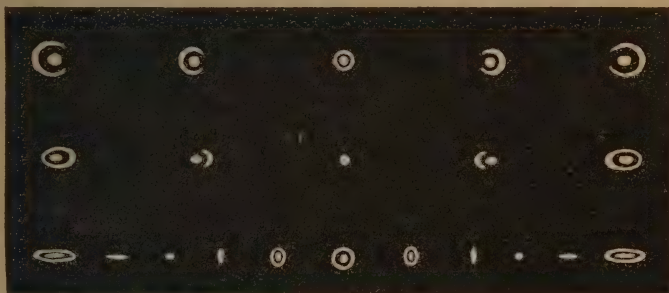


FIG. 7.

THE THEORY OF ZONAL ABERRATIONS.

In the year 1889 an exceedingly valuable contribution to our knowledge of the phenomena of zonal aberration was made by Dr. A. Steinheil in a study which he made of the refraction of rays through the objective of the celebrated telescope made by Fraunhofer for star measurement at the Observatory of Königsberg. This objective is an uncemented achromatic system of one flint and one crown glass. The diameter of its aperture is 144 millimetres, or approximately 6 inches, and the distance of its principal focus from the vertex of the last surface is about 2261 millimetres, or about 88 inches, the true focal length for axial rays being about one-third of an inch greater. With that extraordinary patience, precision, and skill which characterises all his work, Dr. Steinheil proceeded to calculate the zonal aberrations for this lens in the following manner. He considered the surface of the lens as

¹ Dr. Adolf Steinheil: Ueber den Einfluss der Objectiveconstruction auf die Lichtvortheilung in seitlich von der optischen Axe gelegenen Bildpunkten von Sternen bei zweifelsigen Systemen.—"Sitzungsberichte der k. bayerischen Akademie der Wissenschaften," Bd. xix., page 413, 1889.

mapped out into zones, and chose 25 points, one at the centre, 8 at equidistant points round the outer edge, and 8 others on each of two intermediate concentric circles, making 25 points in all. Assuming a ray, parallel to the axis, to fall on each of these 25 points, he proceeded, by the aid of the trigonometrical formulæ of von Seidel,² to calculate the exact paths of each ray, and to find the place where it intersected the focal plane. The whole of the elaborate calculation was then repeated for a similar set of rays parallel to an oblique axis. The obliquity chosen was slight, being such that the oblique axis intersected the principal axis at only 48' of arc, or would give on the focal plane an image about 32 millimetres away from the centre. For photography of star groups, or for heliometric measurements of the stars (for which the Königsberg instrument was specially designed) it is desirable that even in the case of such small angular distances from the axis as this, the images of stars should be as free from aberration as possible. The results of the calculation were plotted on a scale enlarged two thousand times, and were published in the plates accompanying Steinheil's memoir. The calculations were made for yellow light only, no account being taken of secondary spectrum or of diffraction. It was known that the lens was not entirely free from spherical (*i.e.*, central) aberration, and the calculation showed that there was also zonal aberration present. The following are the figures:—

	Distance of Focus from Back Face.	True Focal Length.
For lens centre	2261·6792	2269·1862
For zone at $\frac{1}{2}$ radius	2261·6666	2269·2301
For zone at $\frac{3}{4}$ radius	2261·6293	2269·3635
For zone at periphery	2261·5722	2269·5883

The values are in millimetres, whereas in Steinheil's memoir they are given in Bavarian "lines." Simple inspection of the figures will show that the lens was under-corrected for spherical aberration, the distance of the focus for the peripheral zone being slightly less than for rays through the centre, while the centre had really a slightly shorter true focal length, or, in other words, magnified a little more than the peripheral zone. Fig. 8 gives, reduced to a scale of eight hundred times, the forms of the aberration curves. The small circle at A shows (magnified on the scale of 800:1) the least circle of aberration at the principal focus on a screen placed at 2261·5956 millimetres' distance, while at B is shown (on the same scale) the coma for the oblique ray at 48' as described. The screen was then moved nearer to the lens, or, rather, the calculation was applied to ascertain the figures that would be so formed on the screen if moved nearer to the lens by 0·351 millimetre. Here C depicts the central, and D the oblique aberration figure. On displacing the screen a second time by an equal amount towards the lens, the two figures changed to E and F respectively. The similarity of these calculated figures to those obtained in the experiments already described is self-evident. Critical examination of these figures reveals several points. Fig. 8, C, and Fig. 8, E, shows also, though less obviously, that the lines of the several concentric zones are not equi-distant; the middle part of the lens magnifies more than the peripheral part does.

² L. Seidel: *Trigonometrische Formeln für den allgemeinen Fall der Brechung des Lichtes an centrirten sphärischen Flächen.*—"Sitzungsberichte der k. bayerischen Akademie der Wissenschaften," November 10, 1866, page 263.

Fig. 8, F, shows an arrangement of the zonal patches almost identical with that found in Fig. 5, G, above. But the one was obtained with a minute obliquity of $48'$, at a place 0.7 millimetre short of the principal focus,

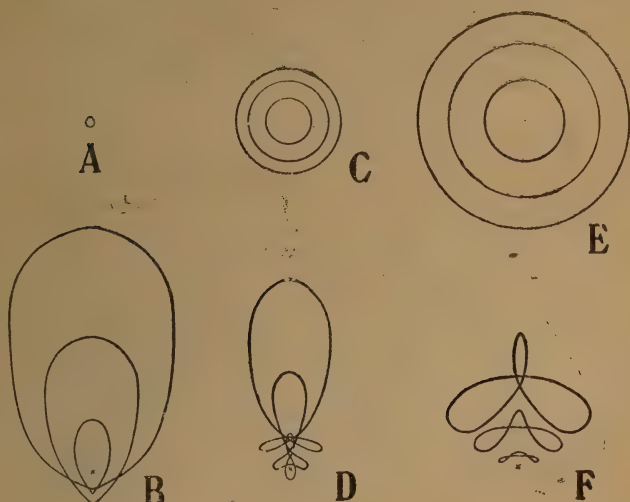


Fig 8.

and was $\frac{1}{50}$ of a millimetre in its greatest width, while the other was observed with an obliquity of about $30'$, at a place much nearer to the lens than to its principal focus, and was over 5 inches in width.

After obtaining these results, Dr. Steinheil, remarking that the Fraunhofer objective was not completely corrected for spherical aberration, proceeded to redesign the lens, leaving the crown glass absolutely unchanged, but slightly changing the curvatures of the flint lens, so that the refraction was slightly less equally divided between its two surfaces. The performance was then as follows:—

	Distance of Focus from Back Face.	True Focal Length.
For lens centre	2261.6876	2268.9345
For zone at $\frac{1}{2}$ radius	2261.6866	2269.0443
For zone at $\frac{1}{3}$ radius	2261.6834	22 9.2161
For zone at periphery	2261.6886	2269.5872

The principal foci of all zones agree within $\frac{1}{50}$ of a millimetre, the point of least confusion being at a distance 2261.6866 from the back of the lens; the central aberration being therefore practically eliminated. But the true focal lengths of the separate zones still differ from one another, the true focal length of the peripheral zone being longer than that of the centre by 0.6527 millimetre. This being the state of things, the

whole of the calculations for the twenty-five rays were made over again, the resultant forms being given on the same scale as before, in Fig. 9.

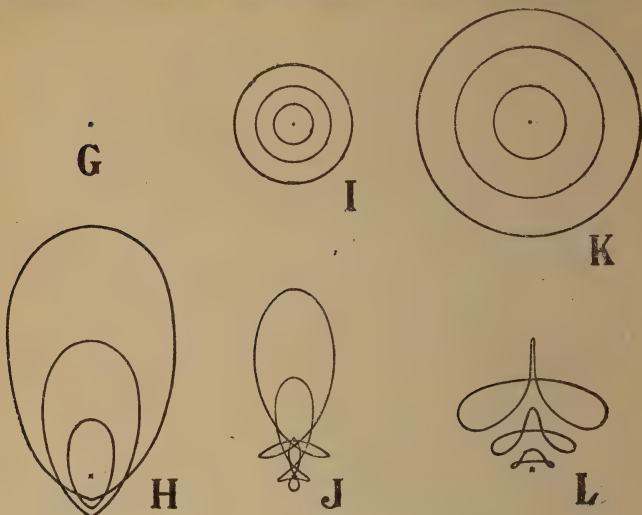


Fig. 9.

It will be seen that, though ordinary spherical aberration has been eliminated (Fig. 9, g), the oblique ray still gives a coma (Fig. 9, h) almost as distorted as before. The pair of figures i and k, were obtained when the screen was displaced 0.351 millimetre towards the lens; and the pair l m when the screen was displaced 0.702 millimetre. The successive zones of i and l are somewhat more evenly spaced than before; but the aberrations due to the outermost zone are actually greater. The lateral distortions of the coma in k and m are very slightly less than in p and f. It is evident, then, that curing the ordinary spherical aberration does practically nothing to cure the coma-effect from which oblique rays suffer.

But Dr. Steinheil did not stop here. He again redesigned the lens, this time altering both crown and flint glasses, so as to fulfil the conditions desired, and carried out the modification until he obtained equality of true focal length between the central and the peripheral parts of the lens. Both lenses in this change became slightly flatter, the radius of the more curved face of each of them being taken slightly longer. The performance of the lens then became as follows:—

	Distance of Focus from Back Face.	True Focal Length.
For lens centre	2261.6537	2270.1853
For zone at $\frac{1}{2}$ radius	2261.6551	2270.1857
For zone at $\frac{3}{4}$ radius	2261.6568	2270.1859
For zone at periphery	2261.6549	2270.1849

The close agreement of the figures in the last column, shows how satisfactorily the redesigning had succeeded; since the greatest difference is but $\frac{1}{1000}$ of a millimetre, and might well be due to the residual errors of the trigonometrical calculation. Having thus redesigned the lens to eliminate zonal aberration, as well as central aberration, for axial rays, the calculation of the twenty-five different rays for the various zones, was then, for the third time, repeated, and the results plotted as before. Fig. 10 gives these curves.

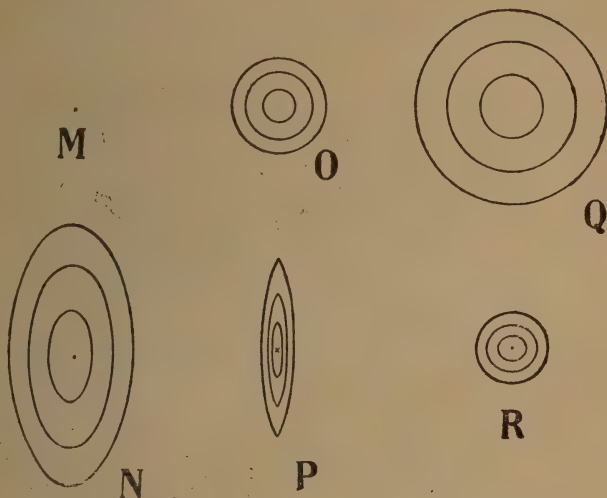


Fig. 10.

It will be at once apparent what a change has come over the lateral aberrations. On the screen set at the place of least confusion, at 2261.6555 millimetres from the lens, the principal focal spot is only 0.00004 of a millimetre in diameter—a point even when magnified 6000 times on the wall diagram. The lateral figure N presents no longer a pear-shaped coma, but shows a system of ovals corresponding to the zones of the lens, with the axial point in its middle instead of being in its tail. The brightest part of this oval coma is at its centre, the light being distributed much more symmetrically in it. On shifting the screen 0.351 millimetre toward the lens, the central figure expands to that shown at P, while the lateral figure contracts to that depicted at Q. On shifting the screen a second time towards the lens the shapes of R and S are given. On comparing P and R with I and L, it will be noted that they are but slightly smaller; while the lateral figures Q and S have completely changed their character, having now become nearly symmetrical, and exhibiting a character of a nearly pure astigmatism. In each the distribution of the illumination is much more favourable. Steinheil himself drew the following conclusions:—

(1) That while errors in the focal point of an objective cause mainly errors in images on the axis, errors in the magnifying power of its different zones cause mainly aberrations in images formed laterally off the axis;

(2) That even small errors in the equality of the true focal lengths for middle and periphery of the lens (assuming ordinary spherical aberration to be absent), exercise considerable influence on the distribution of the light in the images (of stars or points) formed obliquely to the axis;

(3) That symmetry in both radial and tangential directions in the distribution of the light in the image is only to be attained by having the periphery of the lens of the same true focal length as the middle part of the lens;

(4) That for telescopes—and he might have added for photography—the larger the aperture of an objective, the more important is it that its design should in the above respect be rigorously accurate, since the aberrations increase with the increase of size, while the sensitiveness of the eye—or of the photographic plate, we may add—remains the same.

Another theoretical study, but in a wholly different style, is the remarkable memoir of Professor Finsterwalder of Munich,¹ published in 1892. This memoir is a most highly complicated mathematical investigation into the formulæ laid down forty years ago by the late Professor L. von Seidel, with a discussion of the most recondite sort upon the forms of the focal surfaces, and of the curves produced by their intersection by planes. Towards the end, Professor Finsterwalder deals with the shapes of the patches of light which in the generalised imperfect optical system are formed as the images of a luminous point, and deduces from his equations the theoretical forms of these singular ovals, and twisted lines which we have seen to be the zonal images of the luminous point. He then goes on to consider the distribution of the light in these focal patches, and the changes of form which they undergo when a circular stop is placed either concentrically or eccentrically over the lens. The mathematical discussion is exceedingly deep, quite impossible of being abstracted in any simple or popular way, and not always easy to follow. He gives in some lithographed plates the forms of the zonal patches calculated for a certain meniscus lens, and for the Königsberg heliometer objective as corrected for central aberration by Steinheil.

In 1898, after the death of Professor von Seidel, there was discovered amongst his papers ready for the Press, a manuscript of a communication which he had verbally made to the Munich Academy of Sciences so far back as March, 1880. This manuscript, edited by Finsterwalder, was published in the "Sitzungsberichte" of the Academy. It is prefaced by a short introduction by Finsterwalder giving a history of the theory of aberrations, and of von Seidel's part therein. In the memoir von Seidel recapitulates in a descriptive way his older mathematical theory of the five aberrations due to form of the lens surfaces, and of the five mathematical conditions for their successive elimination. He had shown that these aberrations may be expressed as being dependent

¹ S. Finsterwalder: Die von optischen Systemen grösserer Oeffnung und grösseren Gesichtsfeldes erzeugten Bilder.—"Abhandlungen der k. bayerischen Akademie der Wissenschaften," Bd. xvii., Abth. iii., 1892.

² L. von Seidel: Ueber die Bedingungen möglichst präziser Abbildung eines Objekts von endlicher scheinbarer Grösse durch einen dioptrischen Apparat.—"Sitzungsberichte der bayerischen Akademie der Wissenschaften," July 2, 1898

upon five expressions, each of which is the sum of a complicated series.⁵ Calling these five summations respectively Δ , B , C , D , E , he had shown that if the design of the lens system be such that $\Delta = 0$ then central aberration is absent (Euler's condition); that if A being $= 0$, B is also $= 0$, then zonal aberration is absent (Fraunhofer's or Abbe's condition); that if A and B being both of zero value, if C is now made $= 0$, then radial astigmatism is cured; and if Δ , B and C being all zero, D is made $= 0$, then the curvature of the plane of the image is eliminated (Petzval's condition); and, finally, that all the foregoing being fulfilled, if also $E = 0$, then the last sort of aberration—namely, the distortion of the image in its own plane, will also be eliminated. He particularly, in this manuscript, rediscusses the elimination of zonal aberration, and deduces a comparatively simple form of equation to express mathematically the general form of the coma-patch, or "light-phantom," as he calls it, which is given by the light that traverses any one of the zones of the lens. He shows that it is allied in form to the epicycloid, being, in fact, obtained by the motion of a point around a circle, the centre of which circle is itself carried, with an angular velocity half as great, around the periphery of an ellipse. He then discusses particular cases. If A is not $= 0$, that is, if ordinary spherical aberration is present, and if a very wide aperture is used for making images within a narrow field of vision so that relatively to A the other sums B , C , D , E are relatively small, the only coma around the image of a bright point (or star) will be a circular disk or patch with the light most concentrated at its middle and gradated thence outwards. The epicycloid is, in fact, reduced to a circle. If, however, $A = 0$, and B is not $= 0$, then, provided again that the aperture is great and the angular field of vision small, the coma-patch will be pear-shaped, each zone of the lens giving rise to a circular patch, but the successive circles, large and small, will not be concentric, but will overlap so that they have as common tangents two lines mutually inclined at 60° ; the peak of the figure being brightest,



Fig. 11.

and corresponding to the oblique ray through the centre of the lens. (If the aberrations of higher order, C , D , and E of Seidel's notation are also present, the images for individual zones will not be circles, but distorted ovals not concentric with one another, in fact, those experimentally obtained in Figs. 5, I, and 5, J, above.) If the conditions are such that $A = 0$, and B also $= 0$, then von Seidel shows that (neglecting all terms in the remaining aberration-sums beyond those of the third order), the epicycloid reduces to an ellipse, of which centre corre-

⁵ Some account of these researches, and an abstract of von Seidel's calculations, will be found in Appendix I. of the present writer's translation of the "Photographic Optics" of Professor O. Lummer.

sponds to the ray that passes through the centre of the lens. This is an evidence that the non-homocentric beam has attained a species of symmetry approaching to a pure astigmatism, such as is exemplified in Steinheil's third series of curves, Fig. 10.

It is possible to illustrate to a certain extent, by experiment, some of the points thus brought out by theory. Take, for example, two simple lenses of equal size and power. One of them is an ordinary equi-convex glass: the other a "crossed lens," that is a double convex having one of its faces about six times as much curved as the other. This form will have minimum central aberration for a parallel beam if its more curved face is turned toward the light. It will have minimum central aberration for a highly diverging beam if its more curved face is toward the light. We will turn it with its less convex face toward the light so as to have much central aberration present. Tilt each of these at an angle of 20° from the axial position, and observe the difference between their aberrations. The addition of a zone plate to each accentuates the difference in the shapes of the coma phenomena. Now reverse the equi-convex lens so that its more convex face is toward the light, and tilt it as before. In this position it will now be found to have more nearly a pure astigmatism in the oblique beam.

SOME PARADOXICAL CONSEQUENCES.

So far as appears, no writer on aberrations has discussed the question of the effect upon the coma of stopping off rays by diaphragms of other than circular shapes. The effects on definition generally of introducing stops of different sizes and at different distance along the axis of the lens are familiar to all who have ever begun even to study the optics of photography. Eccentrically-placed stops are discussed, as just mentioned, in the mathematical disquisition of Finsterwalder. But there the matter ends. Nevertheless, there exists a class of phenomena of a very surprising kind to be observed when opaque objects of different shapes are used to stop off portions of the light traversing a lens. If, in a case in point, an opaque screen be held over half the surface of a lens, then in the coma or other focal patch of light there will be cut away a certain portion, the form of which may be simple or complex according to circumstances; but if the same opaque screen be placed with its edge across the path of the light, not close to the lens, but at some distance beyond, it will cut off a wholly different set of rays. For example, in the experimental disposition of the series of forms, Fig. 3, where an oblique plano-convex lens was used, as in Fig. 2, let the place chosen to insert an opaque screen across part of the beam be that marked *c* in Fig. 2, being the place at which Fig. 3, *c*, is produced. And let a white screen be interposed further on to receive the light. The zone-plate must, of course, be removed from the lens, the coma being cast as a pear-shaped patch on the screen. Then on gradually raising in the plane of *c*, Fig. 2, an opaque sheet of card or metal, the top edge of which is horizontal, the following effect is produced. As the opaque horizontal edge rises there first appears a dark round spot near the middle of the coma-patch. In fact, at this position in space the core-ray that traverses the centre of the lens is the lowest of all the rays, and will be the first to be cut off. As the opaque horizontal edge rises this spot enlarges while preserving a nearly circular outline until it spreads over the whole coma. On examining by the zone-plate the non-homocentric beam, of which Fig. 2 represents, so to speak, a longitudinal section, it is evident that if an opaque obstacle is raised up from below, the first portions of the beam

which it will cut off are not those which form the lowest part of the pear-shaped coma patch on the white screen beyond, but are some which fall within the coma nearer its middle, thus explaining why the shadow of the opaque horizontal edge appears as a detached dark spot. This observation led to the discovery of a number of other cases, which are also merely geometrical consequences of the zonal aberration, but which are best stated in the form of paradoxes.

PARADOX I.—THE SHADOW OF A STRAIGHT LINE IS A RING.

This paradoxical result can be shown with any convex lens, preferably with any plano-convex lens, held obliquely in a divergent beam of light to produce the requisite non-homocentric pencil. With the plano-convex lens of $19\frac{1}{2}$ inches focal length used in the experiments of the earlier part of this lecture the following disposition was found to give the best results. The lens was placed about 35 inches from the arc-lamp, and tilted about 25° around its horizontal diameter. A white screen at about five feet beyond the lens received the emergent pencil of light, and showed the usual oval-shaped coma, resembling that shown in Fig. 2. A thin rod of wood, such as a pen-holder, or, better still, a thin straight wire, was taken as an object to cast a shadow. It was held horizontally about 16 inches from the lens, and raised up so as to cross the pencil of light transversely. Its shadow falls on the screen, and is observed to be a completely detached ring, not perfectly circular, but slightly pear-shaped, as shown in Fig. 12. On raising the rod, its shadow (the ring) enlarges; on lowering it, the ring shuts up to a mere spot and disappears; shifting the rod toward the lens, the ring shadow descends on the screen; shifting it toward the screen, it changes form, enlarges at the lower part, opens out and exhibits simply an arched line across the screen. The explanation of the paradox is fairly simple. If a screen be placed across the beam at the place where the rod was held, it will be seen that there the section of the non-homocentric pencil presents the form of Fig. 3, B; or that of

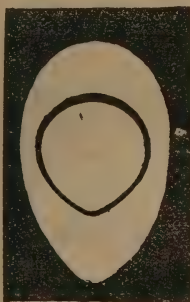


Fig. 12.

Fig. 13. If an opaque rod is held across the beam at the level of the line, *a b*, it intercepts the rays that have traversed approximately one zone of the lens. More accurately it intercepts the rays from a not quite circular and not quite concentric zone of the lens, hence the ring shadow. On lowering it, it intercepts the rays from another and more nearly central zone. The last portion of light to be intercepted is that which in Fig. 2, c,

is the lowest, namely, the core-ray, which consists of the light from the centre of the lens. Hence the dark spot.

PARADOX II.—THE SHADOW OF A GRID MADE OF HORIZONTAL BARS IS A SERIES OF CONCENTRIC RINGS.

This is a mere variant of the preceding: the bars of the grid corresponding to different positions of the horizontal rod (Fig. 14) is photo-



Fig. 13.



Fig. 14.

graphed from a tracing of the actual shadow of a grid formed by opaque lines upon a sheet of glass.

PARADOX III.—THE SHADOW OF A VERTICAL LINE IS A CROSS WITH DROOPING ARMS.

To obtain this effect a narrow rod or straight wire is held vertically across the non-homocentric pencil at a place more distant from the lens

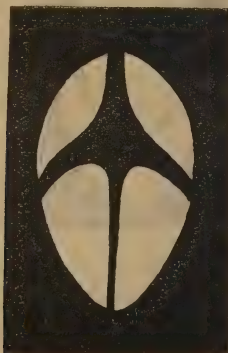


Fig. 15.

than in the preceding case, or 22 inches from the lens if the latter is disposed as described under Paradox I. The explanation is less easy to trace out. The vertical bar of the cross is obviously necessitated by the bilateral symmetry of the whole system. The two drooping arms are due to the circumstance that, in the position chosen, the vertical rod intercepts also some rays from certain parts of the lens, right and left of its median line, which happen to have their place of intersection (in a sort of focal line) just at the point in space where the rod is set. On shifting the rod a little towards the lens these drooping arms move downwards on the screen. On shifting it towards the screen they move upward.

Another way of exhibiting Paradoxes I. and III. is to substitute for the opaque rod a narrow straight slit, such as may be made by gumming upon a sheet of glass two sheets of paper, with a space about three millimetres wide between them. This held horizontally across the non-homocentric pencil throws upon the screen as its "shadow" a bright ring; or, if appropriately held vertically, gives the cross bright on a dark ground. This modification is preferable for showing the paradoxes which follow.*

PARADOX IV.—THE SHADOW OF A CROSS.

If a St. Andrew's cross is made of two narrow opaque rods, set each at 45° to the horizontal, it gives, when placed in the same plane as that used under Paradox I. to produce the ring shadow, a peculiar shadow as of two interesting arcs. A single bar set at 45° gives but one arc, being a

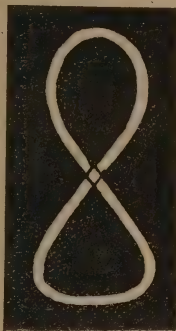


Fig. 16.

portion of a ring-shadow displaced from the middle of the visible field. The shadow of the cross is given in Fig. 17 below.

PARADOX V.—THE SHADOW OF A HORIZONTAL LINE IS A FIGURE-OF-EIGHT.

To exhibit this effect, the plano-convex lens previously mentioned is set as follows: the arc-lamp is placed $17\frac{1}{2}$ inches from the lens, therefore just within its principal focus on that side, giving an emergent beam that is slightly divergent; the convex face of the lens being towards the light. It is then tilted about 30° . The patch of light

thrown on the screen about eight feet away has the general form seen on the right of Fig. 4. If now a horizontal rod be held across the emergent beam at a point about 20 inches from the lens and at a suitable height it will cast a shadow like Fig. 16, being a figure-of-eight of which the lower half is not quite symmetrical with the upper half, being slightly flattened at the base. The effect is better seen by substituting the horizontal slit mentioned above; the figure-of-eight then being cast luminous upon a dark background. On raising the object the upper part enlarges while the lower part of the "shadow" becomes more triangular. On lowering it the upper part contracts while the lower contracts more and disappears. The explanation of this paradox is as follows:—Reference to Fig. 4, which shows the relative positions of lamp, lens, and screen, shows that for the upper part of the lens distance of the lamp is so close to that of the principal focus that the rays through the upper part do not cross the axis before they reach the screen; the highest part of the outer zone of the lens therefore giving rise to a non-inverted arc of light on the screen. But for the lower half of the lens, which is at more than the focal length away from the lamp, the rays cross the axis and strike the screen high up, so that the lower half of the outer zone of the lens gives its arc inverted to the pear shape at the top of the figure. In this "inverted" part the relative parts are also reversed right for left. The curve given in Fig. 6, above, will show the same thing, it being the "image" of the luminous point formed through one zone. Further reference to Figs. 4 and 5 will show that in the planes marked C, D, and E, there are parts where the interposition of a horizontal rod would cut off approximately, though not precisely, all the rays from one zone. If, thus, the light from one zone were cut off, the "shadow" on the screen would give not a circle, but a contorted figure, of which the lower part was a representation of the upper part of the zone, distorted so as to depress it into an arc with its hollow upward, but not inverted right for left, while the upper part of the "shadow" corresponded to the lower part of the zone inverted so as to form an elongated loop, and also perverted right for left. As this must be continuous with the other part of the shadow there will be a crossing-place between the upper and lower halves. Covering up the upper half of the lens obliterates the bottom part of the 8, whilst covering the lower half obliterates the top part of the 8. Covering the right hand half of the lens (as viewed from the lamp) obliterates the right hand half of the lower loop, and the left-hand half of the upper loop of the 8.

PARADOX VI.—THE SHADOW OF A HORIZONTAL STRAIGHT LINE IS A TRIANGLE.

If the same disposition of lens and screen be preserved, and the horizontal object is placed at a greater distance—about 60 inches—from the lens, and at a suitable height, the shadow cast on the screen is observed to be an isosceles triangle, the height of which is about half the length of its horizontal base. If the horizontal object—rod or slit—be raised the triangle breaks into two parts, an elongated base and a detached and curved inverted V. If it is lowered the triangle flattens in form and sinks into a short line.

PARADOX VII.—THE SHADOW OF A HORIZONTAL STRAIGHT LINE IS A VERTICAL STRAIGHT LINE WITH BIFID ENDS.

This effect is less easy to obtain. The lens was placed at 25 inches from the lamp, with its convex face to the light. It was tilted about 50° , and the horizontal object was inserted across the beam at about 33 inches beyond the lens. This vertical bifid line may be regarded







	THE OBJECT	ITS SHADOW
1	—	
2	≡	
3	|	
4	X	
5	—	
6	—	
7	—	

Fig. 17.

as the middle piece of the figure-of-eight greatly distorted vertically. In certain positions of the object it splits vertically into two separate lines that diverge from one another at their ends.

In order to understand the relation between Paradox IV. and Paradox V., which were obtained with the same disposition of lens and screen, a systematic investigation was undertaken. The space between the lens and the screen was explored in a number of equi-distant vertical planes, marked A, B, and C, &c., in Fig. 4. A horizontal rod was laid successively in each of the planes, and its shadow observed when it was raised to different heights.

The results obtained in these experiments are summarised in Fig. 17.

Little as these paradoxical results may seem to have to do with that which most interests this Society, namely, the performance of photographic lenses, it may be at least claimed that their study helps toward the fuller understanding of the problems of lens aberrations. These singular and contradictory phenomena can only take place in beams and pencils of light which are no longer homocentric; and it is precisely this circumstance, that the oblique pencil as it emerges from the lens is no longer homocentric, which gives rise to the coma and to the radial astigmatism which perturb the perfect definition toward the margins of our photographic pictures. If we understand the one set of phenomena we shall comprehend the other. The study of coma may be a matter which interests the lens-maker rather than the lens-user. To the lens-maker, and particularly to the lens-designer, a knowledge of these effects, and of their origin, is vital. They have their origin in the zonal aberrations which have occupied our attention this evening.

THOUGHTS CONCERNING THE NATURE OF THE LATENT IMAGE.

I.

In the "Journal" in 1901 we published a paper by Dr. Luppi-Cramer, of Charlottenburg, which was read before the Verein zur Förderung der Photographie on January 11 of that year. The full account of the experiments there referred to has been published in the "Photographische Correspondenz," and, as it is of great interest, we give the following translation of this contribution to the literature of the subject.

The fundamental question in the theory of photography as to the nature of the latent image remained in a dormant condition for a great number of years. The sub-haloid theory was generally considered sufficiently in agreement with other theoretical aspects of the subject, and with the teachings of experience. But the resuscitation of the nascent silver theory in 1899 induced various investigators to make fresh experiments, and these resulted in Eder's refutation of the arguments of the nascent silver theorists, and the rehabilitation of the sub-bromide theory.

As every hypothesis with insufficient grounds has no claim to rank as a theory, it may be in a certain sense a hindrance to the advance of science if we fail to estimate it at its true value. For this reason it is dangerous to rest satisfied with the sub-bromide theory. Even if its competitor be no better, an attack upon such a hypothesis always tends to elucidate the question, and the resuscitation of the nascent silver theory has been of service in compelling us to revise all the old arguments for and against, and to adduce new ones in opposition to it and its rival in the field. Our literature has thus been enriched by a series of valuable experiments. Experts, who no longer took interest in the question of the nature of the latent image, have had their attention directed once again to the fact that our theoretical knowledge of the process by which the developable photographic image is formed is as defective as its practical services are immense, if not ideal.

It is not my purpose to reinvestigate the nascent silver theory, nor do I propose to attack the sub-bromide theory, but the various experiments I have made show so clearly how little many of the old arguments prove for or against both hypotheses, that it may not be unimportant to make these results known.

The experiments, in which metallic silver was brought into contact with silver bromide during development, were regarded as the chief support of the nascent silver theory. Eder then demonstrated that the old experiment with silver wire was untenable, as it could be easily proved that the reaction failed to take place in the absence of pressure. The reduction induced by the wire was merely a common case of fog caused by pressure. The so-called contact experiment was repeated by the adherents and opponents of the nascent silver theory in various forms, metallic silver powder and moistened silver, reduced by metol, being used for the purpose. On the one hand, the experiments were attended by very uncertain results, whilst on the other it was absolutely necessary to withhold belief in their conclusiveness, because the negative results with comparatively coarse particles of silver did not exclude the possibility that a finer form would bring about the expected reduction. The finest form of silver with which we are at present acquainted is doubtless the deposit formed in the development of a photograph by the Lippmann colour process, as the particles most approximate in size to the wave lengths of light. I therefore prepared

some bromide of silver emulsions by the Lippmann process, and we will call for sake of convenience the silver obtained from these by reduction "grainless silver."

Ten grammes of gelatine were dissolved in 150 c. c. of water containing 2.5 grammes of bromide of potassium, and a solution formed of 10 grammes of gelatine, 150 c. c. of water, and 3 grammes of silver nitrate was added at 40° C. A bluish opalescent solution was obtained, which was reduced with the following solution: 10 grammes of crystallised sulphite of soda, 100 c. c. of water, 1 gramme of hydroquinone, and 5 c. c. of ammonia (sp. g. 0.910).

Reduction took place immediately. After a lapse of ten minutes 10 c. c. of glacial acetic acid was added to the dark brown emulsion, which, in a thin film, was quite transparent. This was to prevent further superfluous action upon the gelatine by the products of oxidation in the developer. The emulsion was then poured upon ice, and, after setting, broken up, and washed in the usual way for 24 hours to remove any trace of soluble products.

A similar bromide of silver emulsion was prepared at the same time, reduced with ferrous oxalate as a check, to show whether the other emulsion contained any product which might be due to the oxidation products of the developer and their action upon the gelatine. Five grammes of sulphate of iron were dissolved in 25 c. c. of water, and 15 grammes of oxalate of potash dissolved in 75 c. c. of water was added thereto. Reduction takes place considerably slower with iron than with hydroquinone, but is complete in an hour. However, traces of iron were still found in the gelatine after sulphuric acid had been added to destroy them, although the emulsion had been washed for 24 hours. As basic ferric salts were probably present, the emulsion was melted again; 5 c. c. of dilute sulphuric acid, 1 in 5, were added, and, after setting, the emulsion was again washed for 24 hours. It was then found to be quite free from iron.

In this way I obtained two kinds of grainless silver, which were then used to ascertain their effect upon a gelatino-bromide of silver emulsion of high sensitiveness. I added to a quantity of bromide emulsion, equivalent to 5 grammes of AgBr, 5 c. c. of silver emulsion. This represents about 0.40 grammes of metallic silver, and the plates thus prepared were tested in the wet and dry states. In order to make an exact comparison of the results, the emulsion, without any addition, was exposed each time with two plates to which the silver was added. One of the plates charged with silver was fixed, whilst the other was developed simultaneously with the original emulsion.

It was found that metallic silver, even in this finely developed state, had no influence upon the silver bromide emulsion, as the developed negative, which had been charged with silver, was only distinguishable after fixation from the pure silver bromide negative by the presence of the same quantity of silver which was visible upon the plate coated with emulsion plus silver, which had been fixed as a check.

As the conditions were the same, both with the silver reduced by hydroquinone and by iron, it could be assumed that the presence of any other product than silver and gelatine in the reduced emulsion was excluded.

My next experiment was directed to the conversion of the grainless silver obtained in the manner described into sub-bromide by bromising it directly. 0.6 grammes of bromide, in the form of a 1 per cent. aqueous solution, was added to an emulsion of grainless silver, prepared in the manner already described and containing 2.5 grammes of AgNO₃. This was in the proportion of 1 part of Br to 2 parts of Ag, necessary

for the formation of sub-bromide. To watch the transition in the colour of the red-brown silver emulsion, a sample was taken and examined by daylight after making each addition of 20 c. c. of bromine water at intervals of five minutes. In all the experiments the precaution was observed of adding the bromide in the dark room. The colour passes through various shades, difficult to describe, to red-violet.

Although 2 parts of silver had been brought into presence of 1 part of bromine, according to theory, it was not, of course, certain that sub-bromide was actually present, but it could be assumed that this hypothetical substance had at least been partially formed. The method of preparing silver sub-bromide from sub-bromide of copper, as described by Otto Vogel seems less likely to succeed with gelatine, because of the difficulty of completely removing the copper from the emulsion, which Waterhouse's repetition of Vogel's experiment also seems to indicate. But I made use of the reactions given by Vogel for sub-bromide in testing the product of my experiment for the bromising of silver. The substance was partially soluble in thiosulphate, and the colour showed a marked change by assimilating itself to that of the silver emulsion, which favours the generally accepted process of the decomposition of the sub-haloids into metal and bromide. The addition of ferricyanide of potassium to the thiosulphate instantly rendered the solution colourless.

To obtain further information, and ascertain if the bromine had to some extent combined quantitatively with the silver in the gelatine emulsion, a further molecule of Br was added to part of the bromised emulsion, which already contained 2 parts of Ag to 1 part of Br. In the event of the combination being quantitative, the further addition of bromide would effect a complete conversion to bromide of silver, but such was not the case, as it was necessary to add nearly half as much again as theory required in order to convert it to the pale silver bromide giving a clear solution with thiosulphite of soda. The aromatic odour of the bromised emulsion also proved that part of the bromine had formed organic compounds. In consequence of this the experiments with the hypothetical sub-bromide were made on the one hand with the product obtained by adding the theoretical quantity of bromine, and on the other with that obtained by adding 50 per cent. more bromine. This was of a dark steel-blue colour.

If the sub-bromide is a substance amenable in some degree to chemical reactions, it is reasonable to assume that it should be present in these various bromised products, and, as the first series of experiments showed that metallic silver did not exert any action, and that partially formed AgBr must also be inactive, the experiments with these products of bromine should eventually confirm the sub-bromide theory to this extent. But it was found that the addition of these substances had no more influence upon a bromide emulsion than had metallic silver in the first experiments. It was consequently impossible to obtain a synthetical confirmation of the sub-haloid theory in this manner.

The destruction of the latent image by the direct action of bromine, or by substances bringing about an indirect action of the halogens, has always been regarded as the principal argument for the sub-bromide theory, and Eder recently cited this fact again in his paper on the "Silver sub-bromide theory versus the nascent silver theory," as an argument in favour of the sub-bromide theory.

By conducting the experiment of adding the bromine to the latent image upon a gelatino-bromide plate, in a new way, I found that in

this particular instance the destruction of the latent image is no proof whatever of the sub-bromide theory.

In each instance a freshly prepared 1 per cent. solution of bromine was used, and pairs of plates were soaked in it for five minutes, one before and the other after exposure. They were then washed in running water for $2\frac{1}{2}$ hours. The action of the bromine before and after exposure was precisely the same. There was no trace of an image in both instances, whilst the unwashed check plate gave a correctly exposed perfect negative. The image was not entirely removed by a 0.1 per cent. solution of bromine, used in precisely the same way, and the formation of a negative was not prevented by previously treating the plate with the same dilute solution of bromine. Traces of an image in the high lights were visible in both cases, but twenty times the exposure did not suffice to produce the same effect when compared with a normal undipped plate. An exact comparative experiment was therefore made, it being probable that the light had changed considerably after a lapse of $2\frac{1}{2}$ hours, whilst the unexposed plate was being washed after treatment with bromine. Undipped check plates were exposed before and after, and estimated relatively. It was found that bromine had more influence upon the plate before exposure than upon the latent image.

The plates used in this experiment were found to be very strongly tanned and slightly reddish in colour after fixing. Upon examination it was found that the gelatine films treated with the 1 per cent. solution of bromine were quite insoluble in boiling water, and after destruction of the gelatine with strongest nitric acid it was found by means of silver nitrate that the gelatine had combined to some extent chemically with the bromine, in accordance with the experience of Eder.²

The experiment I have just described, which show that bromine affects the plate to a greater extent before than after exposure, seems to overthrow the only support of the sub-bromide theory. Yet the further fact that bromine converts the sensitive film to an insoluble substance, when used in the quantity we have specified, and even partially remains in it after the plate has been washed, deprives the experiment of conclusiveness in relation to the sub-bromide theory. The absorption of bromine also fully accounts for the fact that the plate treated with bromine before exposure shows less distinct traces of an image than that which had been so treated after exposure.

These experiments show that it is impossible to obtain any knowledge by means of gelatine plates concerning the action of bromine upon the latent image on account of the susceptibility of the medium to change. It was therefore decided to use collodion emulsion plates, which were prepared according to Baron von Hübl's formula.³

The plates were dipped in a 1 per cent. solution of bromine after they had set, and it was found that not only the latent image, but likewise the entire sensitiveness of the plate, was destroyed by the bath. With normal exposure no trace of an image was obtained, but the check plate was found fully exposed. A trial with a 0.1 per cent. solution gave traces of an image with a plate dipped before exposure, and the sensitiveness was apparently reduced to one quarter the speed of the original emulsion, but the same bath completely destroyed the latent image.

We thus have definite proof that bromine attacks the latent image more vigorously than the unexposed plate. Nevertheless this experi-

² Eder's "Handbuch der Photographie," iii., p. 68.

³ "Die Collodium-Emulsion," von Hübl, Halle, 1894.

ment is not a conclusive proof of the sub-haloid theory, Elder⁴ himself having written "that the nascent silver theory might be brought into harmony with it." In fact, I found that the 1 per cent. and 0.1 per cent. solutions of bromine, which I had used, also converted collodion emulsion negatives very rapidly to silver bromine, which could be completely dissolved with thiosulphate of soda.⁵

II.

As nothing inconsistent with the sub-haloid theory had been proved by the experiment of subjecting the latent image upon a collodion plate to the action of bromine, it seemed not without reason to continue the investigation by the synthetical method, and add sub-bromide to the collodio-bromide emulsion. Although this had not given any positive result with gelatine emulsion, the difference between gelatine and collodion emulsion in many other processes suggested that it might lead to something decisive concerning collodio-bromide of silver in conjunction with other facts. I prepared some grainless silver in collodion, and from it some sub-bromide, but found that collodio-bromide emulsion could not be easily reduced by a developer dissolved in alcohol. The rapidity with which reduction took place, when the developer, plus ammonia, was dissolved in water, seemed to offer insufficient guarantee for the fineness of the grain, and I therefore merely reduced nitrate of silver dissolved in collodion. Five grammes of silver nitrate dissolved in 5 c. c. of water and 25 c. c. of alcohol were added to a solution of 10 grammes of pyroxyline in 200 c. c. each of alcohol and ether. To this $1\frac{1}{2}$ grammes of hydroquinone dissolved in 20 c. c. of ether, and 5 c. c. of ammonia (sp. gr. 0.910) diluted with 25 c. c. of alcohol, were successively added.

The emulsion reduced in this manner resembles the gelatine emulsion, being grainless and dark brown in colour. It was poured in a fine stream into water, and well stirred, then washed in running water for 24 hours, and the water extracted by immersion for two hours in several changes of alcohol. The pellicle was then dried superficially and dissolved in hot glacial acetic acid. It did not seem safe enough to bromise it in alcohol, lest the latter might be acted upon by the bromine. The colour of the silver emulsion in glacial acetic acid was reddish-brown. It was then slowly converted at 40° C., by a solution of bromine in 10 parts of glacial acetic acid, in such a manner that we again had 2Ag to 1Br.

In this process the silver collodion emulsion first changes in colour to blue-green, then to dirty olive-green, and finally to greenish-grey. After the emulsion had stood 10 minutes it was freed from acid by again precipitating it in water and washing it with water for 24 hours. After repeated treatment with alcohol it was again dissolved in ether and alcohol, and the emulsion was then added in various proportions to several portions of collodio-bromide emulsion.

The result which might be expected from hypothetical sub-bromide of silver actually occurred. It was found that the addition of a small quantity

⁴ "Photographische Correspondenz," 1899, p. 404.

⁵ The treatise by Eugen Englisch, "Ueber die Einwirkung von Brom auf das latente Bild" ("Archiv für wiss. Photogr.," 1899, p. 282), did not come under my notice until my work was finished. On the whole, the results are the same. (Note by the author, dated January 14, 1901.)

of bromised silver produced upon development a very decided reduction of the silver bromide forming the stock emulsion, the plate being completely blackened. Of course, a plate coated with silver bromide emulsion only was used to check the experiment, and another, to which a similar quantity of bromised product had been added, was merely fixed. As in all experiments of such importance, I repeated the process of preparing sub-bromide in collodion, by starting again at the beginning, and in so doing I thought it might be interesting to ascertain the effect of the intermediate product (the metallic silver) upon a collodio-bromide emulsion. The result was a surprise. The silver had precisely the same effect as the bromised product. The support of the sub-bromide theory was gone, and one for the nascent silver theory had been found.

The question appeared to be of such theoretical importance that I endeavoured to ascertain the possibility of a source of error. Notwithstanding the precautions which had been taken, it might be due to fogging of the silver bromide by certain products which the collodion had retained through want of amenability to diffusion of the broken-up pellicle. The most simple course seemed to be coating plates thinly with emulsion and washing them in the usual way for the next set of experiments, rather than purifying the emulsion containing reduced silver by precipitation. The washed plates were then immersed in alcohol, and the film was scraped off and dissolved in alcohol and ether. In this case, also, it was found that the silver reduced by the hydroquinone, which had been added to the emulsion, invariably fogged the plate completely. To be quite certain that the fogging action was not due to any product of decomposition of the developer, I tried reducing the silver nitrate dissolved in collodion, by means of pyrogallol and likewise formaldehyde, but with the same result. Sulphate of iron was also tried. In consequence of the insolubility of the oxalate of iron salt in alcohol, the experiment was made by immersing the collodion film containing the silver nitrate in a 30 per cent. solution of sulphate of iron. It was then washed in acidulated water, next in running water, and after the water had been extracted with alcohol the film was dissolved in alcohol and ether. The silver reduced by iron is of a whitish-grey colour, whilst that reduced by hydroquinone, pyrogallol, and formaldehyde is of various shades of colour, ranging from greenish-brown to ruby-red. As silver reduced by iron behaves in the presence of silver bromide emulsion in the manner we have already described, every possibility of doubt is excluded that silver prepared in this manner acts as the nascent silver theory presupposes with regard to nascent silver. The action of bromised silver in regard to the sub-bromide theory is rendered inconclusive by these results, because the bromine product may always contain silver, and the removal of this substance from the emulsion seems impossible.

The chief argument against the nascent silver theory was based upon the indestructibility of the latent image by means of nitric acid. Eder used in his experiments a collodio-bromide wet plate with excess of silver nitrate, and laid stress upon the fact that nitric acid was present at the time of exposure. Eder came to the conclusion that highly concentrated nitric acid did not destroy the latent image.

In repeating the experiments I thought the presence of nitric acid undesirable, as the problem of the latent image could only be decided for a special instance of quite peculiar character.

To ascertain the behaviour of collodion emulsions in presence of nitric acid, I used the latter in more dilute form (acid, nitric, sp. gr. 1.153, diluted with an equal quantity of water, consequently a solution containing 12.5 per cent. of HNO_3). The coated plates were wetted, drained, and dipped for one minute in the acid, and then well washed. As in the pre-

vious experiments, this was done alternately, before and after exposure. A plate not treated with acid was always exposed and developed simultaneously with the others. It was found that the plate dipped in nitric acid before exposure gave a precisely similar image to the undipped plate, whilst the one treated with acid after exposure only gave sufficient density in the high lights. The half-tones were thin, and looked as though they had only received one-fourth the exposure of the check plate.

Upon using acid containing 33 per cent. of HNO_3 , the plate dipped before exposure again gave an image resembling the undipped plate, whilst the one treated with acid after exposure only showed a slight deposit in the high lights. Nitric acid of this strength readily dissolved the fine particles of silver of a Lippmann colour photograph, but not the deposit of which a collodion emulsion negative is formed. This led me to play the last trump by using concentrated nitric acid, sp. gr. 1.4 = 65 per cent. HNO_3 .

Acid of this strength visibly attacked the collodion at the edges. The latent image completely disappeared, but the plate dipped before exposure still gave a vigorous negative, although it appeared to be rather less exposed than the undipped plate.

The possibility of destroying the latent image by nitric acid must therefore be conceded in the exceptional case of a collodio-bromide emulsion without excess of silver, and this disposes of one of the arguments against the nascent silver theory. It is true we are moving in a vicious circle, if we wish to prove the fact of their presence by suppositions concerning the reactions of hypothetical substances, such as sub-bromide. Consequently I merely wish to recall the fact that the reaction of sub-bromide has for a considerable time been accepted in the following form¹:—



If this reaction be correct, the nitric acid experiment would be of no value in deciding between the nascent silver and sub-bromide theories, and since Otto Vogel, in another place, confirms the reaction, as given above, for his sub-haloid, we have some reason to assume that any sub-bromide which may be present in the latent image would also be destroyed in the treatment with nitric acid.

We will now shortly sum up the results before we proceed further with the investigation.

1. The use of bromine is purposeless for deciding between the two theories, as metallic silver as well as sub-bromide are converted by it to normal bromide of silver.

2. The nitric acid experiment is likewise useless, because, according to the views which have hitherto been accepted, metallic silver as well as sub-bromide are converted by nitric acid. In addition, the latent image, when associated with collodion emulsions, is destroyed by nitric acid, and, as Eder's investigations have shown that the latent image upon a wet collodio-bromide plate, with excess of silver, is not destroyed by nitric acid, we have here another interesting example, showing that the idea of the latent image must not be taken offhand as identical in all its varieties.

3. The synthetical experiment (addition of metallic silver and sub-bromide to the bromide emulsion) shows an essential difference between gelatine and collodion plates. With collodion emulsion, metallic silver, as well as sub-bromide, bring about reduction, but this is not the case with gelatine emulsion.

Can anything definite be deduced from these results in favour of either of the theories under consideration? I think not. Although the addition

¹ Eder's 'Handbuch der Phot., ii," part 6, p. 53.

of grainless silver to the collodion emulsion brings about a reduction of silver bromide in development, it is not necessary that metallic silver should be formed by exposure to light, and, though I am glad to admit that I have rescued one experiment, which had been refuted by the opponents of the nascent silver theory, I do not believe that I have strengthened its position in so doing.

The possibility of the physical development of a plate fixed immediately after exposure has been adduced as an important confirmation of the nascent silver theory, but in my opinion this is not quite correct. From the earliest days of photography we have proofs that vapours, or solid bodies in the nascent state, deposit themselves only upon the exposed portions of solid bodies, without presupposing the occurrence of any chemical change during exposure, so far as our scientific knowledge goes. In 1842 Moser propounded a theory of Daguerreotype, according to which it was not a chemical process, but due to the condensation of vapour of mercury, in the same way as ghost images are formed, and he found that an image could be developed upon a Daguerreotype plate by using aqueous vapour. The interesting experiment by Waterhouse, which excited so much astonishment at the Paris Exhibition, is of this nature. Waterhouse obtained an image by exposing a plate of pure metallic silver, and developing it in the mercury box. In such a case it is quite contrary to our views to assume that a chemical change in the metal may have been brought about by light.

Moreover, I should also mention that the possibility of development after fixing, if even the presence of silver particles had been established, would have proved nothing of importance in favour of the nascent silver theory, because hypothetical sub-bromide, according to our supposition, is divided into metal plus bromide by treatment with thiosulphate of soda.

If we are unable to accept either the nascent silver or the sub-bromide theory, we must, for further study of the nature of the latent image, consider the question whether there is reason to believe that exposure to light causes a reduction of silver bromide or any chemical change whatever. Doubtless there are many reasons in favour of the assumption of a chemical change. It is easy to prove by smell that prolonged exposure of a bromide film causes the liberation of bromine, if we expose a dry plate for a few hours to bright daylight. It must also be admitted that the phenomena of solarisation can more easily be explained, as Eder has stated, if we assume that a substance is formed during exposure with properties placing it intermediate between silver and silver bromide, but this cannot be taken as an important argument in view of the indistinct conception we have of the process of solarisation.

It must also be acknowledged that the theory of chemical sensitisers presupposes absorption of bromine, and its consequent liberation during the time of exposure, but our theory of sensitisers may also be incorrect. If we consider that the most important chemical sensitiser is silver nitrate, we must concede that the absorption of bromine by silver nitrate is plausible, but we must not forget that we have in opposition to this a totally different range of sensitiveness in collodion emulsions, according to how we prepare them, whether by formation of silver bromide in presence of excess of silver, or bromine: and subsequent removal of every trace of excess of silver. The physical modifications of silver bromide differ so enormously that, in my opinion, the most important problem in photography appears to be, "What is upon the plate before exposure in the various instances of different kinds of silver bromide?" rather than "What is formed by exposure?"

My experiments relating to the incorporation of molecular silver with emulsion also show how different quite analogous cases in photography

turn out to be from a chemical point of view. It would be difficult to decide whether the chief factor should be sought in the different condition of the silver bromide, or that of the metallic silver, as the incorporation with gelatine emulsion of the silver from collodion, or with collodion emulsion of silver from gelatine, cannot be effected without using a fresh medium, say, an organic acid, as in the so-called Vogel process, but this would involve totally different conditions.

I was enabled to ascertain by the use of collodion plates that bromine affects the latent image more than it does bromide of silver, even before exposure, as the absorption of bromine by the medium is excluded in the case of collodion. Still there was evidence of very strong action by the bromine upon the silver bromide, and, so far as our knowledge goes, this was physical. It is possible, therefore, that the action upon the latent image is only physical, and that it may be stronger when the bromide of silver has been changed molecularly by the action of light.

How can we possibly explain the colossal difference in the sensitiveness of silver bromide if we assume that the development of the latent image is a simple chemical process? In discussing chemical sensitisers Eder writes:—"The cause of the high sensitiveness of gelatine emulsion seems, however, to be ascribable principally to the formation of a special definite modification of silver bromide." How much weight do we find attached in this statement to the theory of chemical sensitisers? In the case of a collodio-bromide emulsion without excess of silver we have no sensitiser; yet there is very much greater sensitiveness than in a gelatine emulsion of fine grain suitable for the Lippmann colour process, notwithstanding the fact that we have gelatine present in the latter as a sensitiser. There can be no doubt that gelatine absorbs bromine, but there is no proof whatever that bromine is liberated during the short exposure that is given in the camera. If we take into consideration that the difference in sensitiveness between an emulsion for the colour process and that of a modern instantaneous plate is as 1 to 20,000, what meaning is there left in our theory concerning gelatine as a sensitiser?

We might satisfy our want for a cause by taking Liesegang's deduction into consideration. He endeavours to explain it as a kind of fermentary growth of the particles which are first reduced, transmitted by purely chemical means to the silver bromide by the formation of larger aggregates, "or in a certain measure, chemical units" ("gewissermassen chemischer individuen"). Sensitiveness in a certain manner goes hand in hand with size of grain, and this consideration, which is quite true, would satisfy our mind to some extent, but we must not forget that there are very coarse-grained varieties of silver bromide, and they are exceptionally sensitive. The only consequence that would likewise follow from Liesegang's formula is that density would be greater with a coarse grain, because more particles of silver forming the grain would be reduced at starting. But it is well known that this has very little to do with high sensitiveness. In the bromine experiment with the collodion plate before exposure there was a considerable loss of sensitiveness, but it was impossible to form any conclusion in the case of the gelatine plate, because bromine had been absorbed by the gelatine. It would be difficult to ascertain whether the chemical sensitiser itself, or the silver bromide, had suffered through the alteration in the gelatine. Observations of the action of nitric acid upon gelatino-bromide plates again disclosed very interesting results, but really nothing positively decisive concerning the question. The often-repeated experiment concerning the action of nitric acid upon gelatino-bromide or silver with regard to the latent image was made with the object of determining if metallic silver was present in the latent image, but the experiment was of no avail in this direction, as the gelatine was destroyed

by using acid of sufficient strength to dissolve the silver. But it is remarkable that a secondary effect appears to have been overlooked by other experimentalists, although it impressed me very much in repeating the experiment.

An exposed gelatino-bromide plate was dipped for half a minute in rather dilute nitric acid (1 part of acid, nitric, Ph. G. + 3 parts of water). A broad strip was protected from exposure, as in all my experiments. The gelatine suffered considerably in the bath, but still held together on the plate. After thorough washing, the plate was developed simultaneously with another, which had been coated with the same emulsion but not dipped in acid. Contrary to expectation, the plate which had been treated with acid blackened all over, whilst the check plate, of course, remained unaffected at the margin, where it had not been exposed. The officinal nitric acid still gave the same result, even after it had been diluted 10 and 50 times, although there was no apparent action upon the gelatine, and the dilution had to be increased to 500 times before any action of the kind was eliminated. A veiling action upon the unexposed silver bromide was also observable with sulphuric acid, but it did not appear to attack the gelatine so readily, nor to give as much fog. A 10 per cent. solution of sulphuric acid seemed to be about equal to a 2 per cent. solution of nitric acid of the pharmacopœia. A 5 per cent. solution of ammonium persulphate acted similarly to these acids.

It is more difficult to understand that three agents, so chemically different, act in the same way upon silver bromide, than if we regard it as a reaction upon the gelatine. We thus have another interesting fact which is difficult of explanation. The process of development needs as much elucidation as that of exposure. Although the gelatine, which forms the envelope, is but slightly attacked, the silver bromide is immediately affected by the developer, just as though it had been exposed to light. This is still more remarkable than the fact to which I recently drew attention, that substances which are not developers, such as gallic acid and formaldehyde, reduce precipitated silver bromide in the absence of a colloidal body, with the greatest ease, whether exposed to light or not. It is incomprehensible that a chemical change can have been effected in the silver bromide by the dilute acid or the persulphate, and there is no ground to suppose that a physical change can have occurred. A change in the gelatine may therefore be postulated in this reaction, especially in consideration of the fact that silver bromide in collodion does not appear to be affected in the least by the strongest nitric acid.

It thus appears that the formation of the latent image is not a simple process. Several processes seem to take place concurrently, and the "substance" of the latent image also appears to vary in various photographic processes. We cannot affirm positively that the process is a chemical one, and we have as little reason to infer from the facts that a purely chemical change in the silver bromide occurs, since the properties of the medium appear to exert a species of chemical influence.

Perhaps further experimental investigations may at no distant date give us nearer clues, and lead to a true theory of the latent image. I think I have shown that very little can be done with our present hypotheses.

III.

The preceding work concerning the latent image was finished in November of last year, but since then I have continued my investigations, partly by extending the experiments already described, and partly by a solution of the problem.

I should like in the first place to describe some experiments which I have made in consequence of correspondence with Eder. Eder reminded me of the possibility of bromine attaching itself molecularly to silver bromide, and that an explanation might thus be found for the loss of sensitiveness which I had observed with collodion emulsion plates dipped in bromine water before exposure. In the event of bromine attaching itself molecularly to silver bromide, it might be presumed that powerful absorbers of bromine would attract the halogen, and thus counteract the action detrimental to sensitiveness.

I used sodium nitrate for the purpose, which immediately reacts upon bromine, even when it is much diluted, and it is improbable that it reacts upon silver bromide. I found that dipping the plate for two minutes in a 2 per cent. solution of sodium nitrite, followed by washing, did not exercise the slightest influence, either upon a fresh collodio-bromide plate, or upon one which had been previously dipped in a 0.5 per cent. solution of bromine. The silver bromide was not affected in the least even by a 10 per cent. solution of sodium sulphite, nor was a plate which had been perviously dipped in bromine water. It seems therefore that a molecular attachment of Br to AgBr is excluded.

It will have been noticed that my experiments with collodion emulsion plates disclosed that the latent image is destroyed by nitric acid. This was in apparent contradiction to the experiments made by Eder, who obtained the opposite with wet collodion plates. Eder pointed out to me that collodio-bromide emulsions often contain traces of bromine salts, which are tenaciously held, and in this case the nitric acid might liberate bromine, which might destroy the image. In the case of a wet plate this possibility would be excluded by the presence of excess of silver. I consequently tried to render any possible traces of bromine salts harmless by treating the plates with a solution of silver. As it was found that rather strong neutral silver baths completely veiled the collodion emulsion, I could only use very weak acid solutions of silver.

The stock solution was formed of a 20 c.c. of a 10 per cent. solution of silver nitrate, plus 5 c.c. of nitric acid, sp. gr. 1.4 and 175 c.c. of water. This was diluted for use to one-tenth of its strength. The collodion emulsion plates were dipped in it for two minutes, and then thoroughly washed. It was found that the bath increased the sensitiveness considerably. If a plate treated in this manner with an acid silver bath is exposed, and then subjected to the action of strongest nitric acid, the latent image will still be completely destroyed. As the sensitiveness was raised by the silver bath, it follows that possible traces of a bromine salt had certainly been converted, and that the action of the nitric acid cannot be indirectly explained by the intervention of bromine. The action of silver nitrate upon collodio-bromide emulsion is very peculiar. If the plate be dipped for two minutes in a 1 per cent. silver bath, and then thoroughly washed and exposed, we obtain, as already stated, a completely veiled plate with a very indistinct image. If a plate, previously dipped for one minute in a 0.5 per cent. solution of bromine, be treated in the same manner in the silver bath, a clear negative is obtained, which looks as though it had received considerably more exposure than the plate treated with bromine only, and it is equal to a plate coated with normal emulsion. If a plate be first treated with silver, and then with bromine, the same result follows as in the reverse procedure. The veiling action of the silver bath is counteracted. A very striking fact was observed in the action of the silver bath upon the collodion emulsion. The colour of the film was considerably changed, and passed from bluish-white to yellowish-white. On the other hand, treatment with bromine did not cause any perceptible change of colour.

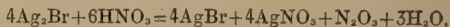
The action of the silver bath upon a plate previously treated with bromine might easily lead to the mistake that the bromine remains in some form upon the plate, notwithstanding the washing process, and that this added bromine is converted to bromide of silver by the silver bath. But I do not see any reason on chemical grounds why the nitrite and sulphite should not have acted the same in this case. It is improbable that silver nitrate should be permanently precipitated from the dilute solution upon the bromide plate, and, as we had to conclude that the action of the silver nitrate brings about a physical modification of the silver bromide, we may as reasonably infer the same in regard to the bromine.

I must also mention that the addition of silver nitrate to a finished collodion emulsion increases the sensitiveness considerably. This remains unaffected by washing. The well-known difference in sensitiveness of collodio-bromide emulsions prepared with excess of silver, or bromide, is still observable when the silver bromide is prepared with excess of bromide and the emulsion digested with silver nitrate after it has been washed.

Further experiments in regard to the action of nitric acid upon the latent image not only gave the answer to the contradiction between Eder's results and my own, but an entirely new point of view for the consideration of the latent image. By using the above-mentioned stock solution of acid silver nitrate without dilution before exposure, and submitting the latent image to a bath of strongest nitric acid, a distinct image was obtained, but no image appeared when the silver bath (or one reduced to one-tenth of its strength, as previously mentioned) was omitted. In the same way that a silver bath of suitable strength, used under otherwise similar conditions, will prevent the complete destruction of the latent image, so the action of nitric acid may be compensated for by prolonged exposure. An exposure of forty minutes sufficed to produce upon a plate, afterwards dipped for one minute in strongest nitric acid, an image of the same strength that an undipped plate gave in one minute. The reverse is also true. By prolonging the action of the acid bath (four minutes instead of one minute) no trace of an image is obtained with forty times the exposure.

It is thus comprehensible why Eder found that the latent image was not destroyed. He used considerable quantities of silver nitrate, and the acid was of far lower strength than that used in my experiments. But a new light is thrown upon the nature of the latent image by the fact that light action and a preparatory silver bath on the one hand, and strength and duration of the acid bath on the other hand, may mutually replace each other, and give the same negative.

From these experiments it follows that the meaning we attach to the destruction of the latent image is quite relative and fluctuating. But, according to my conception of the subject, the probability is that it should be quite definite, if the latent image is a definite chemical substance, which differs from silver bromide in its composition, be it metallic silver, hypothetical sub-bromide (Ag_2Br), or any other compound of silver with bromine of a different degree of oxidation; or, lastly, a compound of any of these bodies with the organic substance forming the support. If we assume that in prolonging the exposure a larger quantity of the "substance" of the latent image is formed, and that this substance is converted to an irreducible silver bromide, or something else, according to the old formula,



then it seems probable that this substance would be destroyed by the

large excess of nitric acid in its evident fine state of division within the sensitive film, be its quantity X or 40 X. This view receives considerable support from the thermo-chemical calculation of Hurter and Driffeld (Eder's "Jahrbuch," 1899, page 202), which shows that the amount of light action which is effective in a normal exposure represents but a small fraction of the energy required to produce complete chemical decomposition of the silver bromide. By adopting the sub-bromide theory, we could merely assume the existence of nascent sub-bromide, and the setting up of further reduction by development in the same manner as shown in my first experiments by the introduction of metallic silver and bromised silver into collodio-bromide emulsion. The experiment with nitric acid, and that with bromine and silver nitrate, seem, in my opinion, to support the view that the latent image is a physically changed modification of silver bromide. As we are also able to show that such enormous differences in the modifications of silver bromide exist, we must further assume that a few varieties, more or less, are not a matter of importance.

In my first paper I mentioned that we find ourselves in a *circulus vitiosus* regarding the nitric acid experiment and its bearing upon the sub-bromide theory.

Has it actually been proved that anyone has produced sub-bromide of silver identical with the unknown hypothetical "substance" of the latent image? In chemical literature (see Dammer's "Handbuch der Anorganischen Chemie," Vol. II., Part II., p. 772) silver sub-bromide is quite unknown. On the other hand, we have many references to sub-chloride, and the existence of a sub-chloride prepared from Ag_2O , in the form of a brown powder, seems to be fairly established. The data concerning the composition of this sub-chloride fluctuate between the formulae



It is stated in regard to this sub-chloride that its dark colour remains unchanged by the action of nitric acid, and that no silver is taken up from it by warm nitric acid. The reaction of this sub-haloid supports the view that the latent image must be insoluble in nitric acid if it consists of sub-bromide. It is a hazardous undertaking to transfer the properties of a substance prepared in the manner described above to the hypothetical substance of similar chemical composition in the latent image, where quite different molecular conditions and finer divisions obtain, but in that case the supposed confirmation of the reaction of nitric acid upon the photographic plate does not hold good. It is quite true that the bromide of silver to a gelatine plate, which has been much darkened by exposure to light, does not lose its colour by prolonged boiling in nitric acid, but silver bromide which has visibly darkened by exposure to light has become quite solarised, and, although the properties of this substance may be of value in the examination of the problem of solarisation, they are beside the mark in considering the question of the latent image in its restricted sense.

Within the limits of these experiments it seemed of interest to make further attempts to prepare some true silver sub-bromide, so as to study its properties with certainty. In my first paper I have shown that the direct bromising of metallic silver in a gelatine emulsion was a failure because of the simultaneous action of the bromine upon the gelatine. Otto Vogel's method of preparing silver sub-bromide by way of the analogous compound of copper was also impossible with gelatine. But I succeeded in preparing an emulsion of a substance, by way of sub-bromide of mercury, which may be termed silver sub-bromide with

some show of reason. Fifty grammes of gelatine and 4 grammes of ammonium bromide were dissolved in 500 c. c. of water. At 40° C. a cold solution of 10 grammes of mercurous nitrate dissolved in 100 c. c. of water and 3 grammes of nitric acid, sp. gr. 1.4 was added. The mercurous nitrate is rapidly decomposed, notwithstanding the free acid, and, as basic salts are formed, the solution must be used at once. A bluish-white, very fine-grained emulsion of sub-bromide of mercury was obtained, which was poured out to set, then broken up, and washed for two hours. If a solution of nitrate of silver be added to a small quantity of this emulsion the gelatine will coagulate immediately by the formation of the mercurous salt, and it is consequently necessary previously to add 20 c. c. of glacial acetic acid. A solution of 16 grammes of silver nitrate in 100 c. c. of water may then be added in small quantities to the emulsion of sub-bromide of mercury. This is considerably in excess of the theoretical quantity necessary (13 grammes). It produced an extremely fine-grained emulsion of a brownish-black colour, which I thought I was entitled to regard as sub-bromide of silver. After setting, the emulsion was broken up and washed for twelve hours in running water. The colour changed considerably, and was of a rather light blue-grey tint.

By treating this emulsion with strongest nitric acid the colour rapidly changes to yellowish-white, and bromide of silver is formed. As the emulsion contains a considerable quantity of water, which much reduces the strength of the acid, this indicates that the sub-bromide is readily reacted upon by nitric acid. The ease with which the sub-bromide of silver could be converted, and the importance of the fact in its bearing upon several theoretical questions, suggested the desirability of establishing with greater certainty that the substance was in reality sub-bromide. With this object in view, and to facilitate an analysis, the simplest manner seemed to be to prepare the sub-bromide by means of sub-bromide of mercury without the presence of gelatine.

Four grammes of bromide of ammonium were dissolved in 250 c. c. of water, and to this was added 10 grammes of mercurous nitrate dissolved in 3 grammes of strongest nitric acid in 100 c. c. of water. The sub-bromide of mercury was of a brownish-yellow colour. By adding 14 grammes of silver nitrate dissolved in 100 c. c. of water, much to my astonishment, only a change in colour of the flakes of sub-bromide of mercury to a greenish-white followed, instead of the formation of the dark substance, as in the experiment in the presence of gelatine. The filtrate of these flakes was blackened by ammonia, which indicated the presence of soluble mercurous oxide. The addition of silver to the clear solution produced no change, indicating that there was no halogen present. The addition of nitric acid produced a white precipitate, which was boiled several times in water, and, as might be expected, ammonia turned it black, indicating the presence of a mercurous salt. As the ammoniacal filtrate after neutralisation with nitric acid again produced a white precipitate, the presence of silver was indicated. With regard to the greenish-white precipitate itself, it was found, after thorough washing, to contain silver as well as mercury. Consequently, instead of pure silver sub-bromide, we had some compound or mixture, which was left undetermined, as it was of no interest for the question under consideration. For the sake of accuracy, I would mention that in the gelatine experiment, the necessary acetic acid was added upon repeating the decomposition of the precipitated sub-bromide of mercury with nitrate of silver, and that no difference was found. It was thus impossible by such means to obtain better grounds for the supposition that sub-bromide of silver had been formed by decomposition of mercurous

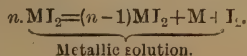
bromide with silver nitrate, and from this last experiment I do not think it at all probable that I had obtained a pure emulsion of silver sub-bromide, especially as the very remarkable change in colour during the washing could not be accounted for.

Nevertheless, I look upon this experiment as a fresh proof that our theory of a sub-bromide is without any foundation, as well as showing how difficult it is to produce sub-bromide.

At the seventh meeting of the German Electro-Chemical Association, Professor Rich. Lorenz, of Zurich, read a paper upon a series of experiments in the electrolysis of fused salts and the behaviour of metals.

Lorenz submitted a series of metallic salts in the fused state to electrolysis, and found that halogen is dissipated, and that the metallic regulus at certain temperatures is partly dissolved in the fused mass.

Lorenz states: It has not yet been established whether this phenomenon, which is of very common occurrence, is due to the metal dissolving in the fused mass, the formation of traces of sub-chloride, or its dissipation as a fine dust, or whether several of these causes are combined. We have hitherto always attributed it to an actual solution of the metal in the fused mass, since it still seemed to be the most plausible assumption, according to all appearances. I have therefore adopted the expression "metallic solution" for my present purpose, but with the reservation that it may not be found quite exact. A second chemical reaction depends upon this solubility of metals in the fused mass, and many metallic halogenides are affected by it. Water does not exist, but under certain circumstances light does. The decomposition occurs more especially with the iodides, and takes place according to the following formula:—



Therefore, without the action of the air, or moisture, traces of halogen disappear, and "saturated metallic solution" is left in the fused mass. From this it seems possible that this reaction may perhaps play a part in the formation of the latent image upon the photographic plate. It is conceivable that bromine, as such, is liberated in minute traces during exposure, and that a fixed solution of silver in silver bromide remains, which induces the formation of the first traces of nascent silver.

Although Lorenz refrains from expressing any positive opinion in these sentences concerning the nature of the latent image, the fact remains, which is not without interest to the present question, that such a fixed solution of metal in a halogen compound has been pointed out. I also think it is not impossible that a metal in such a state of fixed solution should behave in the presence of chemical reagents in a manner differing from its normal state. We thus have another indication that we must not interpret with absolute certainty by purely chemical reactions all that happens in the sensitive film. Assuming then the possibility of our having an unquestionable sub-bromide of silver, that we know exactly the behaviour of this substance, and consequently its action in the presence of nitric acid, we should not attempt to infer from an analogous case of such a reagent in regard to the latent image that the constitution is the same. With reference to degree of strength and length of action, we have no information whatever to guide us as to the effect of nitric acid upon sub-bromide, and as the results of our experiments relating to the action of nitric acid upon the latent image differed considerably from one another, we are quite unable to deduce anything from them for or against the sub-bromide theory.

IV.

A NEW series of experiments concerning the action of various reagents upon the latent image in respect to silver bromide, at last gave results which seemed to promise a modification of the theory of chemical sensitisers and likewise the idea that bromide is liberated during exposure.

It is generally known that oxidising agents, or substances used to promote the action of a halogen, either destroy the latent image or reduce it, and it is also known that these substances reduce the sensitiveness of a gelatine-bromide plate very considerably. All these substances exert action upon the plate by affecting the permeability and other qualities of the gelatine, and cannot be removed by washing. Experiments with gelatine plates as to their effect upon sensitiveness are therefore valueless, and the results must be looked upon as distinct from the action of these substances upon the latent image. This difficulty is absent in the case of collodion emulsions, as the medium is quite indifferent to many of these agents and does retain them, so far as can be ascertained.

A.—The following agents for introduction of halogen by means of oxidizing agents were used:—Chloride of iron, chloride of copper, persulphate of ammonium, permanganate of potash, ferricyanide of potassium, and chromic acid. A 1 per cent. solution of these substances was used, and the chromic acid solution was prepared by adding 10 c. c. of diluted sulphuric acid (1 : 5) to 200 c. c. of a 1 per cent. solution of bichromate of potash. Normal exposures were given in each case, and the baths were allowed to act for one minute upon the plate after thorough washing.

I.—Chloride of Iron.—The latent image was destroyed. If used before exposure, the sensitiveness was reduced to one-sixth or one-eighth.

II.—Persulphate of Ammonium.—(The solution was not acidified, but was allowed to stand for 24 hours. This is known to be necessary for reduction with this substance, when the preparation is quite neutral.) Persulphate was found to be much less active than chloride of iron. The latent image was not completely destroyed, but the negative looked as though it had received only one-tenth of the exposure. When used before exposure, the sensitiveness was only reduced by half.

III.—Permanganate of Potash.—This acts peculiarly, the result being the same whether used before or after exposure. In both cases only slight traces of the image remain.

IV.—Bichromate of Potash and Sulphuric Acid.—(Neutral bichromate did not exert any appreciable action either before or after exposure.) The latent image was completely destroyed. The bath reduced the sensitiveness to about one-fifth.

V.—Chloride of Copper.

VI.—Ferricyanide of Potash.

{ These acted much more strongly
upon the latent image after, than
before exposure.

B.—Halogen Absorbers.—If a plate coated with collodion emulsion is dipped for one minute in a 1 per cent. aqueous solution of hydroquinone, and then thoroughly washed (the effect is the same whether the plate be washed for 10 minutes or 3 hours) the sensitiveness is doubled, and there is no trace of fog. The same effect is also produced by adurol, which is a substituted halogen product of hydroquinone. On the other hand, there is no observable increase of sensitiveness with pyrogallol, metol, gallic acid, and sulphate of iron. Nevertheless, it seems to be merely a question of time in the case of these substances to obtain the same effect, for by adding an alcoholic solution of pyrogallol to a certain quantity of emulsion and washing it after digestion for several hours, similar action is observable.

Precisely the same effect was observed with narcotin, concerning which Von Hubl had noticed that its action as a sensitiser does not visibly assert itself until some time after.

These facts seemed to be of considerable importance in connection with the theory of sensitisers. According to H. W. Vogel, a chemical sensitiser is understood to be a substance which absorbs bromine, and, by its predisposing affinity for that substance, facilitates its liberation during exposure.

If these experiments show that the increase in sensitiveness also occurs after these sensitisers have been for more or less time in contact with the unexposed silver bromide and then completely removed from the film, a very different conception of the nature of silver bromide, as it exists within the photographic film, seems highly probable. Before proceeding further, I must endeavour to remove certain objections.

The old theory of sensitisers would doubtless remain valid if it could be proved that traces of the bromine absorber remained in the film notwithstanding careful washing. This, for instance, is actually the case with tannin, which cannot possibly be removed from the collodion film by washing. But tannin is an exceptional substance, whose tenacious, "corrosive" properties are made use of extensively. In the same way that tannin clings obstinately to the film, ferrocyanide of potassium clings to the silver bromide, and not to the film itself. It was also used formerly as a sensitiser. It need scarcely be said that I have tested the substances used as sensitisers to ascertain if they adhere to the collodion or the silver bromide. Hydroquinone, adurol, pyrogallol, and narcotin leave no residue in the film that can be detected. With regard to the analogous action of silver nitrate used as a "sensitiser before exposure" (for it may be thus described), a collodion emulsion, which had been digested for some time with an acid silver nitrate solution, was washed until every trace of silver had been removed, and then treated with strongest nitric acid for destruction of the collodion. The filtrate did not show the slightest trace of silver.

Notwithstanding the impossibility of proving it analytically, the objection, of course, may be made that traces of bromine absorber have remained in the film. But until some kind of proof is adduced, I think this hypothesis is merely dictated by a predilection for the theory of chemical sensitisers.

Some observations concerning so-called "preservatives," dating from wet collodion times, seem to indicate that in those days it was known that the preservatives might be removed from the film without destroying their sensitising action. Wet plates often suffered from the disadvantage of evaporation of the solvents during long exposure. The concentrated silver solution attacked the iodide of silver and produced irregularities in the film. Abney¹ recommended washing the sensitised plate (or removal of the sensitiser), and resensitised after exposure (for physical development). The following quotation from that goldmine of the history of photographic literature, "Eder's Handbuch" (Part II., p. 305), also bears upon this:—"Fothergill was the first to observe that preservatives might be washed off a bromo-iodide collodion plate, and that sufficient would be retained to exert action." The mere analogy of the action of substances which part with halogen or oxygen, and which easily permit very delicate chemical reactions being made, also reminds us of the possible influence of substances which have an opposite action upon silver bromide. Chloride of iron, permanganate, chromic acid, and persulphate may be readily detected in small quantities, and are not retained by the film. . . . In the same way that my experiments with nitrite and sulphite showed

¹ Eder's "Handbuch der Photographie," Part VII., p. 154.

that the sensitiveness of silver bromide suffered very considerably, although every trace of the bromine bath had been removed; so did they also show that plates treated with chloride of iron and permanganate were not affected by a bath of sulphite.

We may therefore look upon it as proved by these experiments that substances which absorb bromine may so affect SILVER BROMIDE that its sensitiveness to light is increased, and that substances which impart halogen or oxygen diminish its sensitiveness.

This contrast, which is most strongly marked on the one hand, in the best sensitiser, silver nitrate, and on the other hand, in bromine, the substance par excellence for introducing halogen, naturally directs our attention definitely to the action of these agents. I have already explained that it is not chemical, but rather physical in its nature. If we look upon silver bromide as a definite, stable substance, there is no ground whatever for the chemical action of bromine upon it, and especially for the opposite action of substances, which, like narcotin, are far from being, in the normal chemical acceptation, active absorbers of bromine. The behaviour of emulsified silver bromide appears to indicate that the substance should be regarded as an unstable, loose compound, in which Ag. and Br. are at least to some extent in a similar state to ions in a solution.

I leave it to expert electro-chemists to consider whether this conception is justified, and will merely add a few other facts, which led me under entirely different conditions to consider the theory of ions in my study of the latent image. In my paper, entitled "Researches Concerning Optical Sensitisers,"² I showed that precipitates, such as silver bromide, sulphate of barium, carbonate of calcium, and oxalate of lead, when stained with dyes of the eosin group, are bleached by salts, which have the same ions as the insoluble substances to which the stain has been given.

The use, in everyday practice, of bromide of potassium in development can only be understood by examining the theory of ions. The action of bromide is very remarkable when a solution of the salt is added to silver bromide by precipitation in an aqueous solution. Although pure silver bromide is immediately reduced by the developer, without the action of light, no reduction takes place in the presence of a bromide salt.

In the course of my examination of the reasons in favour of a chemical modification of silver bromide during exposure, the theory of sensitisers, which presupposes the liberation of bromine during exposure, had to be taken as the chief argument. In recognising the fact that the sensitisers may be removed from the film and yet perform their function, the assumption that the sensitiser acts as an absorber of bromine during exposure becomes superfluous. Sensitisers only act in the same manner as those agents such as alkalies and certain alkaloids, which promote the ripening of silver bromide, and which are added to the emulsion for digestion, and then removed by washing.

In what manner these substances act upon silver bromide, it is difficult to conceive, but since all substances which promote ripening are capable of absorbing bromine, and those which part with halogen hinder it, there seems to be reason to infer that a kind of association of the silver bromide compound is present prior to exposure, and that the impact of the rays of light so far promotes it that the developer is enabled to effect complete reduction.

The fact that precipitated silver bromide may be easily reduced by the developer in the absence of light, has hitherto been completely disregarded in the theory of the latent image, but it proves in a striking manner that it is quite necessary to assume that reduction

² "Archiv für Wissenschaftliche Photographie," Vol. III., No. 2,

takes place during exposure. By the comparative experiment of suspending precipitated silver bromide in a solution of gelatine, it is proved that the mere enclosure of the particules of silver bromide by the vehicle is not the cause of the normal emulsified silver bromide being unreduced in the absence of exposure to light. The developer is quite as effective in reducing the silver bromide in a very short space of time.

IT IS THEREFORE QUITE UNNECESSARY TO SET UP HYPOTHESES CONCERNING THE SUBSTANCE OF THE LATENT IMAGE, AS THERE IS NO EVIDENCE WHATEVER THAT ANYTHING BUT SILVER BROMIDE IS PRESENT.

If silver bromide is precipitated in an aqueous solution in the presence of an excess of bromide, and then exposed for three hours to diffused daylight in a flat dish, taking care to keep it moist with water and to completely expose the surface of the bromide by thorough stirring from time to time, it will assume a grey violet colour. It will be evident from the smell of the water covering the silver bromide that it contains bromine, and this may be clearly proved by addition of silver nitrate. The discoloured silver bromide does not yield any silver when boiled in strongest nitric acid, and it does not appreciably change in colour. The product of the exposed silver bromide does not give a clear solution when dissolved in thiosulphate. The greater part goes into solution, but the solution is clouded and greyish blue by transmitted light, which indicates the presence of silver in suspension. The reactions, therefore, indicate that some bromine has been liberated by prolonged exposure to light. If the action of light upon the precipitated silver bromide is watched attentively it will be observed that a preceptible change of colour takes place in a very short time. The silver bromide is at first greenish yellow, but in a few seconds turns green, and then gradually changes to greenish grey. In five minutes the colour is a pure green grey. Up to this point the altered AgBr still gives a colourless solution with thiosulphate, and no bromine can be detected in the water.

It appears to follow from this that bromine is only given off after prolonged exposure, and that light is capable of so affecting the colour that it passes through a very long scale of tints in a very short time.

These facts indicate that light merely brings about a different physical modification of the silver bromide, when the exposure is not too prolonged, and that a distinctly visible change in the colour of silver bromide is not a proof that bromine has been liberated. The strongly marked difference in colour brought about by three hours' exposure to light, is likewise quite out of proportion to the minimal quantity of liberated bromine that may be detected, so that the change of colour cannot be set down to reduction alone, but more likely in the first place to molecular change.

I endeavoured to establish a connection between solarisation and the successive changes of colour through which bromide of silver passes when it is exposed to light, and made experiments to ascertain how far the visibility of the image before development went hand in hand with solarisation. For this purpose I exposed very rapid gelatine plates under a negative in a printing frame to diffuse daylight. After exposure the plates were cut in halves. One half was used to ascertain the colour, and the other was kept for development (metol-soda for six minutes).

I.—Exposure: 10 seconds. By red light no change could be detected, but with an incandescent lamp a slight tint could be seen where the

plate had been exposed under the clear glass edges of the negative. Upon development a very much over-exposed positive was obtained.

II.—20 seconds. By red light no change could be detected. Development produced a peculiar mongrel image, partly positive and partly negative by solarisation. The clear portions of the negative had been solarised, whilst the denser parts of the image produced a positive.

III.—1 minute. By red light there was a perceptible change, but even with this exposure solarisation was not complete.

IV.—5 minutes. The image was completely visible by red light, and a completely solarised negative was obtained.

V.—With an exposure of one hour and a quarter a perfect duplicate negative, full of vigour and almost free from fog, was obtained. It would have been impossible to obtain a better, with the same emulsion, by the usual method of preparing a negative.

VI.—With an exposure of three hours and a half and the same period of development as No. V., there was less vigour than in No. V. From the changes which occur in precipitated silver bromide on the one hand, and emulsified on the other, there would naturally be considerable risk in formulating definite conclusions concerning the chemical changes which are brought about in a solarised dry plate, merely upon the ground of the chemical reactions effected with precipitated silver bromide. Nevertheless, it should be clearly pointed out that solarisation occurs long before any liberation of bromine can be detected. It is, therefore, probable that the product of solarisation may also be regarded as a mere physical modification of silver bromide, and that liberation of bromine, and even the formation of sub-bromide, does not take place until the course of the normal photographic processes, including the beginning of solarisation, has been considerably overstepped. From the experiments I have described it may at least be inferred that the sub-bromide theory should no longer be used as an argument for the possible explanation of reversal.

The knowledge obtained as to the connection between the change in colour of bromide of silver and the reduction which is proved to have taken place, induced me to investigate the behaviour of chloride of silver under similar circumstances. The very complete study, which Scheele made concerning the change chloride of silver undergoes through the action of light, has been interpreted by various investigators in a very different manner. The discrepancies in the results may be explained by the difference in the varieties of the silver chloride, on the one hand, and the widely different quantities of light on the other. A strongly marked change in colour does not by any means imply the liberation of halogen, as we have already shown in the case of silver bromide, and this fact is much more apparent with silver chloride. Ten grammes of silver nitrate were dissolved in 50 c. c. of water, and precipitated by addition of 3.5 grammes of common salt dissolved in 30 c. c. of water. The chloride of silver was thoroughly washed and then exposed in a flat dish to diffused daylight, care being taken to keep it moist and to renew the surface by frequent stirring. In a few moments the colour changed to a blue grey, which finally turned to an intense brownish violet. After four hours' exposure the chloride of silver was collected by filtration and washed. The filtrate, when treated with silver nitrate, was so slightly clouded that it would have been useless to undertake the quantitative analysis as intended. The result agreed with Bibra's observations, that chloride of silver does not lose in weight by exposure to light, and that it "sometimes" can be dissolved in ammonia without forming any precipitate. Other investigators have observed a loss in weight of several units per cent.

I thought it would be extremely interesting to study the action of light upon precipitated silver chloride in the presence of silver nitrate, as it might at the same time throw light upon the theory of chemical sensitisers in relation to the sub-haloid theory (absorption of the liberated halogen and the consequent inception of further reduction, according to H. W. Vogel's theory), and likewise upon the chemical basis of the printing-out process. Some pure chloride of silver was again prepared, and as much silver nitrate was added to it as had been used to form the AgCl . The change in colour under the action of light was watched simultaneously with that of some pure silver chloride. It was at once apparent that the change in colour in both instances proceeded with *the same intensity*, although the shades of colour may differ slightly (pure chloride of silver turns to a brown violet colour, but in the presence of AgNO_3 , it tends to blue violet). After the same exposure had been given the discoloured silver chloride was filtered and washed until the silver nitrate had been completely removed. Contrary to expectation, it was found that the presence of the silver nitrate had not induced any appreciable liberation of halogen, not to mention the formation of any metallic silver. Upon treatment with strongest hot nitric acid no trace of silver could be detected, and when dissolved with thiosulphate the cloudiness did not exceed that of the chloride of silver exposed without any addition of silver nitrate. I should like to add that upon exposing the $\text{AgCl} + \text{AgNO}_3$, the liberation of a small quantity of ozone could be distinctly detected by the smell, as stated by Hodgkinson.*

The supposition was shown to be incorrect, that, according to the theory of sensitisers, the liberation of halogen might probably be assisted by silver nitrate, if the silver chloride be reduced in presence of excess of silver nitrate. It may therefore be affirmed, in regard to silver chloride, *that the assumed reduction to sub-chloride, or even to the metallic state, is not promoted in the least by silver nitrate.*

Although it does not fall strictly within the scope of this paper, the question is so nearly related to it that it may not be out of place to give some explanation as to the possibility of bringing this statement into harmony with the fact that metallic silver is formed in the printing-out process.

H. W. Vogel explains the action of $\text{Ag} + \text{AgNO}_3$, in the printing-out process in the following manner:—" AgCl alone would not give a vigorous image, but the chlorine, which is liberated, immediately forms fresh silver chloride by combining with the nitrate of silver, which is also present. This is reduced in turn, and the repeated formation and reduction of silver chloride produces a much more vigorous print in much less time upon paper, when nitrate of silver is present, than when pure silver chloride alone is used. Hence the use of a mixture of both for the positive process."

According to the experiment we have described above, the explanation of the printing-out process is not so simple as Vogel seemed to think.

In the ordinary printing process we have, in addition to AgCl and AgNO_3 , the vehicle, the paper, and usually some organic acids. In the case of albumenised paper, the vehicle also contributes to the formation of the image. With gelatine papers the vehicle is also, to some extent, amenable to reduction, but with collodion papers, on the other hand, it is tolerably inactive. The simplest course seemed to be to take chloride of silver without a vehicle. To ascertain the action of citric acid and citrate, the same quantity of silver chloride was taken as above, and

* Eder's "Handbuch der Photographie," I., p. 176.

the reduction was made after addition of 10 grammes of silver nitrate and 3 grammes of citric acid, or citrate of potash. The mixture was exposed in the same manner as before, and after five hours it was thoroughly washed. The product of exposure was tested for metallic silver by treatment with hot concentrated nitric acid. It was found that the presence of free citric acid had promoted the reduction of metallic silver to an appreciable extent, but that the quantity was very small in comparison with the large amount of metal obtained by using the citrate.

This is quite in harmony with general experience. Printing-out papers always give flatter images if AgCl and AgNO_3 are used without organic substances that form silver salts. If free citric acid suffices in the case of collodion, the explanation is to be found in the fact that the free acid also forms a citrate with the silver salt in alcoholic solution.

A PARTICULAR ACTION OF THIOSULPHATE UPON THE LATENT IMAGE.

Abney and Wilde discovered simultaneously the valuable property, for photographic purposes, of thiosulphate as an addition to the oxalate of iron developer, or as a preparatory bath, by means of which development with iron might be considerably accelerated. Up to the present little attention has been paid to its theoretical importance. Both Wilde and Abney attached great weight to the fact that, with thiosulphate, the exposure of the plate might be considerably less than when oxalate alone was used. The preference of many photographers, even at the present day, for development with iron, may perhaps be accounted for by the just recognition of the fact that the iron developer, with a preparatory bath of "hypo," "brings out," from the shortest instantaneous exposures, quite as much as the most rapid organic developer, metol.

But however elegant and certain the development with iron and thiosulphate may be; after a little experience has been obtained, the theoretical explanation of its action has been very inaccurate. The behaviour of thiosulphate was quite incompatible with H. W. Vogel's theory of sensitisation, and Vogel, therefore, classified this and some other similar substances under the rubric of "Development Accelerators," stating that they merely shortened the period of development and did not permit of shorter exposures being used, when they were added to the oxalate developer.

The course of my experiments has shown that mistakes have often arisen in the theory of the production of the photographic image by development, through incorrectly locating the effect of a reaction. It could be proved that bromine and other substances conveying a halogen affected not only the latent image, but also the silver bromide previous to exposure, likewise that the so-called chemical sensitisers need not be present during exposure, but that they perform their services by a kind of ripening process before the exposure takes place. It was thus demonstrated that the theory of sensitisers was unnecessary, and with it the principal argument for the idea that bromine was liberated by exposure to light fell to the ground.

As many photographers rinse the plate after it has been immersed in the preparatory hypo bath, it seemed to me from the outset that the action of thiosulphate in iron development could not be looked upon as a mere acceleration of development.

My first experiment was for the purpose of clearly establishing the kind of action brought about by hyposulphite. By varying the exposure and

period of development, and using on the one hand the ordinary oxalate of iron developer, and on the other a preliminary bath of thiosulphate of soda (1 in 1,000 with 1 minute's immersion followed by superficial washing) almost identical negatives were obtained upon dry-plates, whether the exposure was 8 seconds and development 8 minutes without the preparatory bath, or 4 seconds exposure and 6 minutes development with the preparatory bath.

The negative obtained after use of the preparatory bath appeared to be even a trifle denser, and was distinguishable by its characteristic brown colour. If 5 and 10 seconds exposure and 5 and 10 minutes development be given, respectively, the negative without the preliminary bath is rather the better, so that the previous figures may be taken as being in approximately correct proportion. From this it appears that with half the exposure the preparatory bath also reduces the period of development considerably, so that Abney's statement, to which we have referred, that thiosulphate permits us to reduce the exposure to one-third, does not seem to be exaggerated, if we develop for the same length of time. Under any circumstances, it is not a mere question of acceleration of development. In the next place, to determine if the presence of thiosulphate during development with oxalate is necessary, a plate was washed for three hours in running water after immersion in the preparatory bath. The action of the preparatory bath was almost as marked as when the plate was merely rinsed, or developed with direct addition of the thiosulphate to the developer.

As this showed that the action of the thiosulphate was a step further removed, I next tried to ascertain if it acted upon the latent image, or upon the bromide of silver even before exposure. Identical exposures were given to two plates. One was kept as a check. The other, as well as an unexposed plate coated with the same emulsion, was dipped in the preparatory bath. Both were washed for three hours. The unexposed dipped plate and a second check plate were then exposed, and developed with ferrous oxalate. By comparison of the exposures upon two check plates, it was found that the favourable action of the preparatory bath was only present *after* exposure, and therefore upon the latent image. The increased sensitiveness agreed with the figures given above. The plate treated with thiosulphate before exposure showed general fog and the image appeared to be rather less exposed than the check plate.

The result of these experiments renders the explanation of the action of thiosulphate more difficult.

We may state here that the solution of thiosulphate, even after being used several times as a preparatory bath, did not exhibit any silver (Reagent: solution of liver of sulphur). It could, therefore, be inferred that a double salt of thiosulphate of silver, difficult of solution, or that silver sulphate had been formed, remained in the film. But this neither explains the difference of behaviour before and after exposure, nor why alkaline developers do not derive any benefit for such a favourable modification of the latent image.

The one-sided nature of the action of thiosulphate, in preparing the way to some extent for the oxalate developer alone, reminds me of the observations concerning alkaline gallic acid, which I published a short time ago¹. Alkaline gallic acid does not take part in the process of chemical development, unless metol is used as developer.

Various other substances containing sulphur also act upon the latent image similarly to this sulphate. The action of sulphite of soda is not quite so strong as that of hyposulphite. But that of polysulphide of soda, which was used in the form of official liver of sulphur, was very much stronger.

¹ "Photographische Correspondenz," 1900, p. 161.

A solution of liver of sulphur, in the proportion of 1 to 1,000, decomposes in a very short time, and deposits sulphur. Used in this condition, as a preparatory bath, it augments the capacity for development very considerably and produces a very appreciable amount of fog. Then reaction is so delicate that a solution of 1 in 1,000,000 produces a very marked increase of density in the negative. When the stronger solution, 1 in 1,000, is used the bromide of silver suffers a change of colour, which is distinctly visible in the dark-room, and as it is brownish yellow by daylight, the actual formation of silver sulphide appears to have taken place. Such a change of colour is not observable when sulphite and thiosulphate are used.

It seems very remarkable in using the preparatory bath of liver of sulphur, which actually causes a chemical alteration of the silver bromide, that the increased capacity for development is only observable with ferrous oxalate and not the organic developers.

Thiosinamin, which is known for its solvent action upon the silver haloids, and has even been proposed as a fixing agent, also affects exposed silver bromide when developed with oxalate, but it principally accelerates the development and increases the degree of fog without shortening the exposure. Sulpho-cyanide of ammonium also behaves in a very peculiar manner when used as a preparatory bath (for 1 minute) in the proportion of 1 to 200. In the first stage of development it lays behind the check plate considerably, but it speedily catches up and brings out more detail in the shadows, but at the same time produces a marked amount of fog.

It is worthy of notice that thiosulphate, sulphite, sulpho-cyanide of ammonium, and thiosinamin, are all solvents of silver. But a general hypothesis cannot be based upon this fact, in explanation of the action of these substances, as the polysulphides do not possess this property. The only common property of all these substances is the sulphur they contain.

THE ACCELERATION OF DEVELOPMENT.

If these experiments had shown that thiosulphate and kindred substances were not accelerators of development, but exerted their influence upon the latent image, it would have been possible to prove that ferrocyanide of potassium, recommended by Himly² as an accelerator for alkaline development, only exerts its influence in the actual process of development. Ferrocyanide is not to be compared with thiosulphate in the extent of its action in iron development. In addition to hydroquinone, I observed that ferrocyanide of potash also exerted its influence with adurol, pyrogallol and metol. 50 c.c. of a 20 per cent. solution of ferrocyanide was added to each 200 c.c. of developer ready for use.

On the other hand, if the latent image is immersed for 1 minute in a 20 per cent. solution of ferrocyanide of potassium, and after thorough washing developed with hydroquinone and potash, only a very thin image is obtained, which does not strengthen with prolonged development.

* * * * *

After this digression, if we briefly review the results obtained, we find:—

1. That there is a complete absence of proof of any chemical change in silver bromide consequent upon normal photographic exposure, as the nascent silver and sub-bromide hypotheses are both without sufficient support, and the theory of sensitisers, as well as the explanation of solarisation, upon the assumption of a sub-haloid, both require the pre-

² "Photographische Correspondenz," 1889, p. 160

supposition of a chemical change by exposure, and stand upon a weak foundation.

2. As precipitated silver bromide is easily reduced in the absence of light, it is superfluous to presuppose the existence of a chemically modified silver bromide to explain the process of development.

3. Emulsified bromide of silver appears to be in an unstable condition (dissociated, ionised). In the state it reacts upon numerous chemical substances in such a manner (ripening processes and their prevention), that the action of light is facilitated or obstructed. Actual reduction does not occur until the developer is applied.

We thus return again to the old view, that the process of normal exposure merely effects a change in molecular structure. This supposition is really the most comprehensible, if we keep in view the simple fundamental experiment, that the commonest form of silver bromide, precipitated from an aqueous solution, can be easily reduced, without exposure to light, even by substances that are not "developers" (gallic acid, aldehydes). There are numerous instances of molecular change caused by the action of light. Finely divided selenium is converted to the crystalline state by the sun's rays, and selenium is a better electrical conductor when exposed to light than in the dark (Bell's photophone, selenium photometer). A similar influence upon the electroscope to that of selenium³, has also been observed with sulphur. Crystals of chloride, bromide, and iodide of silver are also reduced to powder by exposure to light⁴. The relation between photo-chemical and electro-chemical processes to which I have drawn attention, are in special agreement with the observations of Arrhenius⁵, that the silver halogenides become conductors of electricity when exposed to light. Bredig's⁶ application of Lenard and Wolf's⁷ observations, concerning certain substances which appear to throw off a fine dust when exposed to ultra-violet light, may serve as a guide for fresh investigations concerning the nature of the structural change caused by the action of light upon silver bromide.

In my opinion, combined electro-chemical and photo-chemical work, arranged upon a definite plan, is likely to be most successful in giving a deeper insight into the nature of the transformation of the silver halogenides, but in any case further investigation of the nature of the latent image should be more physical than chemical.

DR. LUPPO-CRAMER.

ON THE ELIMINATION, BY WASHING IN WATER, OF HYPO RETAINED BY PHOTOGRAPHIC PLATES AND PAPERS.

By MM. LUMIERE FRERES AND SEYWETZ.

A.—ELIMINATION OF HYPO FROM PAPERS.

The elimination of hypo retained by prints on paper, after fixing, is generally attained by allowing water to flow through a receptacle containing the prints. If prints on paper (gelatino-chloride or gelatino-bromide

³ Eder's "Handbuch," I., p. 155.

⁴ Eder's "Handbuch," I., p. 157. "Photographische Mittheilungen," vol. viii., p. 60.

⁵ Eder's "Jahrbuch," 1885, p. 201.

⁶ Eder's "Jahrbuch," 1899, p. 365.

⁷ "Wied. Ann.," xxxvii, p. 443.

of silver) are submitted to prolonged washing in this manner, very large quantities of water are used, and it will be found that there still remains, even after the protracted washing, a trace of hypo. This is easily shown by adding a crystal of silver nitrate to the last drops of moisture obtained by placing the paper under pressure. We are therefore either obliged to allow this trace of hypo to remain, or to submit the prints to washing of such duration that we run a grave risk of spoiling the prints. We have experimented as to the possibility of more rational washing, that is to say, the employment of a volume of water more proportionate to the quantity of hypo to be eliminated. To this end we have employed several methods by which prints can be washed, and have used, in all cases for our experiments, Lumière citrate paper. A single print, 13 by 18 cm., was submitted to a series of washings, in the first series 500 c.c. of water being used for each washing, and afterwards 100 c.c., this being the quantity of water strictly necessary to fully cover the print. In both cases comparative tests were made, allowing periods of five, ten, twenty, and thirty minutes respectively for each washing, and the quantity of hypo eliminated being determined by the use of a solution of iodine and potassium iodide. These standard tests have shown:—

1. That the quantity of hypo eliminated by each washing is the same if either 100 c.c. or 500 c.c. of water be used.

2. That the quantity of hypo found in each washing water is much the same after periods of five minutes, ten minutes, fifteen minutes, or thirty minutes.

These conclusions will be best understood by giving the results of one series of washings, which will serve to illustrate all cases. A 13 by 13 print was allowed to remain for periods of five minutes in 100 c.c. of water, and 80 c.c. of liquid was taken to make the tests with solution of iodine and starch. Before toning, the print was washed sufficiently to eliminate the excess silver nitrate and the citric acid, so that these substances should not affect the tests. The following results were obtained, using a solution of iodine of 1-200 normal:—

Washings each in 100 c.c. Water.	Quantity of solution of Iodine for each 100 c.c. of Washing Water.		Quantity of Hypo corresponding to the Iodine employed found in 100 c.c. Washing Water.	
	Print roughly blotted.	Print simply drained.	Print roughly blotted.	Print simply drained.
1	355	450	0.440	0.588
2	18	30	0.0223	0.0496
3	3.9	6	0.0048	0.0074
4	1.6	1.8	0.00198	0.0022
5	.62	1.25	0.00075	0.0015
6	.5	.5	0.00062	0.0006
7	.25	.25	0.00331	0.00331
8	.125	.125	0.00016	0.000.6

The first numbers show that the quantity of hypo remaining in the print roughly blotted is about twenty times less before the second washing than before the first. Afterwards this quantity markedly diminishes by the second and third washing, and is practically negligible after the seventh washing. In the case of the print simply drained, the elimination is less rapid at first, but at about the fourth washing is nearly equal to that of

the print roughly blotted. By experiment we find that the results are practically identical if the print is only partly washed before toning, and also if not submitted to any previous washing. If the washings are of one minute duration instead of five minutes, the elimination of hypo is much less complete, and after the eighth washing, 0.0013 gramme of hypo is still found in 100 c.c. of water. These experiments show that washings of about five minutes' duration are amply sufficient to obtain the maximum of elimination possible by this means. The preceding experiments have been made repeatedly, with practically the same results. Afterwards, instead of using for observation one print of 13 by 18 cm., ten prints were employed, using ten times the quantity of water, *i.e.*, one litre. The prints were washed in dishes 24 by 30 cm., and kept constantly in motion, being simply drained between washings.

Number of Washing.	Quantity of Solution of Iodine for 100 c.c. Washing Water.	Quantity of Hydro remaining in 100 c.c. Washing Water.
1	302	0.375
2	22.5	0.0279
3	2.9	0.00359
4	0.87	0.00107
5	0.75	0.00093
6	0.5	0.00062
7	0.25	0.00031
8	0.125	0.00015

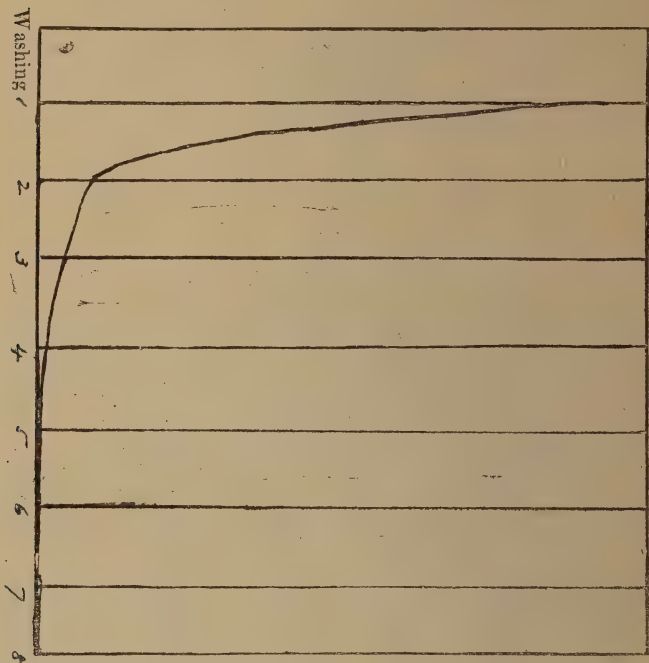
These results seem to prove that sufficient elimination of hypo can be obtained after eight washings, each of five minutes' duration, using 100 c.c. water for each print of 13 by 18 cm., dishes, of course, being rinsed after each washing. We also compared with the elimination by diffusion, the method of washing a print for every twenty minutes under a tap, passing about $7\frac{1}{2}$ litres per minute, *i.e.*, consuming 150 litres of water, afterwards allowing the print to remain for five minutes in 100 c.c. of water, and then testing for hypo. Under these conditions we find 1-1 of solution of ... normal of liquid iodine is necessary; that is to say, about the same quantity as after the fifth washing in the previous method. We repeated the same experiment by changing the dishes after ten minutes, in order to see if the small quantity of hypo remaining at the bottom of the dish hindered the diffusion. The results of the test were practically identical with those in which the washing was uninterrupted. Another comparative test was made by washing the print on the back of a dish for twenty minutes, leaving the print for ten minutes on one face, and ten on the other, with identical results. The results arrived at by the washing of a single print for periods of five minutes in eight changes of 100 c.c. of water can be shown by a curve. The diagram shows at the bottom the number of washings, and by the height of the curve the quantity of hypo present after each successive wash, and it will be seen that the quantity eliminated by the first two washings is some 90 per cent.

THE DIFFICULTIES OF ELIMINATING THE LAST TRACES OF HYPO.

We considered originally that complete elimination of all hypo contained in the print could be arrived at by the employment of one or other of the methods previously mentioned, and we took endless trouble to reach a point at which a complete absence of all reaction to nitrate of silver or solution of iodine would be shown in the last washing water. We found,

however, by the presence of these reactions that distinct traces of hypo remained, and it only needed the application of hand pressure to the print to cause moisture to be expelled which contained hypo, therefore we made a series of experiments to find out by what means it was possible to eliminate these last traces. By submitting the prints to pressure after each washing, we noticed that the quantity of hypo present became less, and was more rapidly eliminated. Elsewhere, this peculiarity has been already verified with different substances, notably with textile fibres impregnated with salts soluble in water. The elimination of these salts is easily procured by wringing. We had various methods of applying pressure. Some

Hypo remaining in print.



drained prints were placed in a pile in a 13 by 18 dish, then pressed, another series of prints after each washing were placed alongside between sheets of blotting-paper, then pressed. Again, we tried combining the two processes, and have verified that it is possible quickly and completely to eliminate all hypo. Care should always be taken, after having pressed all water from the prints by pressing in a heap in the dish, to moisten again before pressing between blotting-paper. However, if the prints are pressed heavily, one beside another, between sheets of blotting-paper, one can succeed, after seven successive treatments by 100 c.c. of water for each

print, in eliminating all traces of hypo, and in obtaining no reaction with silver nitrate. We are struck with the efficacy of this treatment, in comparing it with ordinary methods of proceeding. With simple washing in running water, by floating the prints in a dish, we have washed ten prints 13 by 18 in a dish 24 by 30 for five hours, with a tap passing $7\frac{1}{2}$ litres per minute, or 2,250 litres in the five hours. We can show by pressing the prints that the resulting liquid gives a reaction with silver nitrate, still making evident the presence of hypo. These conditions, also, are not appreciably improved if the dishes be changed every quarter of an hour in order to get rid of the hypo remaining at the bottom; but, on the other hand, they are appreciably benefited by heavy pressing of the prints in the dish, and by draining away the liquid so expelled before placing again in the water.

TRIAL OF WASHING UNDER RUNNING WATER.

In the manner usually employed, hypo collects on the bottom of the dish. By washing the print on a plain surface, the back of a dish, for instance, this trouble is avoided. If moisture be pressed from a print washed for two hours on the back of a dish (under a tap passing 450 litres of water per hour), it will be found to contain a marked proportion of hypo, and this is even found to be the case with a print washed for 24 hours in running water.

NOTE.—The difficulty of eliminating hypo is easily shown by pouring a small pool of water on a print which is placed, gelatine face downwards, on a porous brick, when the print will be found to retain the water on its surface, allowing but the slightest penetration, even if left for a long period of time.

CONCLUSIONS.

The result of the preceding experiments shows that in the usual methods employed for washing prints the bulk of the water used is consumed uselessly. To effectually wash a batch of ten prints, the following method is recommended, as by its use a more complete elimination of hypo is obtained. Wash for five minutes in seven successive changes of water, using a 30 by 40 dish, and one litre of water for each change, keeping prints in motion to avoid them sticking together. Between each washing put the prints under pressure, and drain off the water expelled, then moisten prints in clear water, and place side by side between sheets of blotting.

ELIMINATION OF HYPO FROM PLATES.

The perfect washing of plates is a matter of comparatively less importance than in the case of photographic papers. The matter of the greatest importance is to avoid the formation of crystalline markings on the dried plate, as there is less cause to fear the alteration of the image than when dealing with prints on paper. On the observations we have made regarding the washing of papers we have determined the minimum of water necessary to obtain, at the end of a period of time relatively short, an elimination practically sufficient. We have made our tests with solution of iodine as to how hypo can be eliminated by washing the plate in consecutive changes of small quantities of water (100 c.c. water for periods of five minutes, using a 13 by 18 plate).

Washings each with 100 c.c. of Water for Five Minutes.	Quantity of Solution of Iodine 1/200 normal used for each 100 c.c. Washing Water.	Quantity of Hypo Crystals in 100 c.c. Washing Water.
1	268 c.c.	0.332
2	30	0.0372
3	7	0.00868
4	2	0.00248
5	1.25	0.00155
6	1.1	0.00136
7	0.6	0.00074
8	0.6	0.00074

We thus see that plates, like paper, contain hypo, which cannot be eliminated but by pressure. We have, after the last washing, stripped the gelatine from the plate, and have pressed it in a bag of linen. The liquid expelled by the pressure treated with silver nitrate has given us no visible reaction. This result shows that in photographic papers it is the constitution of the paper or its coating that retains the hypo, and not the emulsion.

COMPARISON OF THE QUANTITIES OF HYPO UNELIMINATED FROM PLATES BY DIFFERENT METHODS OF WASHING.

We have compared the quantities of hypo remaining uneliminated in plates after employing various methods of washing.

Case 1. The plate (13 by 18 cm.) is placed on the back of a dish under a tap, the water running directly on to the gelatine surface; in this case the hypo solution is eliminated in proportion to the dimensions, and the plate is not immersed in the solution already expelled.

Case 2. The plate (13 by 18 cm.) is placed under a tap, as in Case 1, but immersed in a dish, and so surrounded by solution containing a percentage of eliminated hypo.

In these two cases the plates have only been in contact with the water for five minutes, yet 37 litres of water are consumed.

Case 3. The plate (13 by 18 cm.) is immersed in five successive baths of 200 c.c. water, for periods each of five minutes.

In this case only 1 litre of water is consumed.

After each of these three methods of washing the plates were immersed for half an hour in 200 c.c. of water, of which 100 c.c. was treated with a solution of iodine 1-200 normal.

The following results were shown:—

	Quantity of Solution of Iodine 1/200 Re- quired for 100 c.c. Washing Water.	Quantity of Crystal Hypo corresponding to the Iodine.
Washing on the back of a dish for five minutes, using 37 litres water.....	2.2	0.00272
Washing on a dish for five minutes, using 37 litres of water	4.4	0.00544
Five washings in changes of one litre of water each for five minutes.....	0.4	0.005

CONCLUSIONS.

1. That the washing of plates under a current of water, though using a large quantity, is less complete than in a method where, less water being employed, the plate comes in contact with the water containing hypo.

2. That the most effectual method of plate washing, and one which at the same time consumes far less water, is to immerse it in successive baths, allowing 200 c.c. water for each 13 by 18 plate.

In a future article we propose to deal with the method of hypo elimination by the use of various substances.

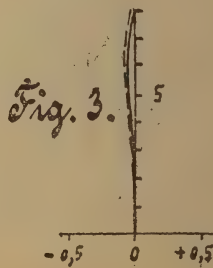
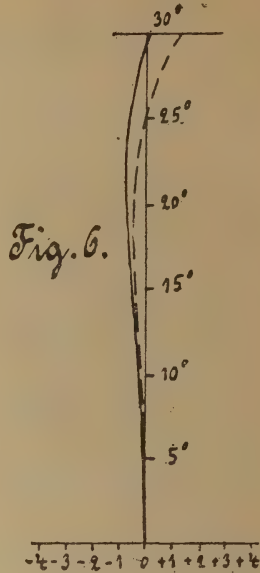
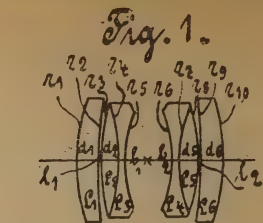
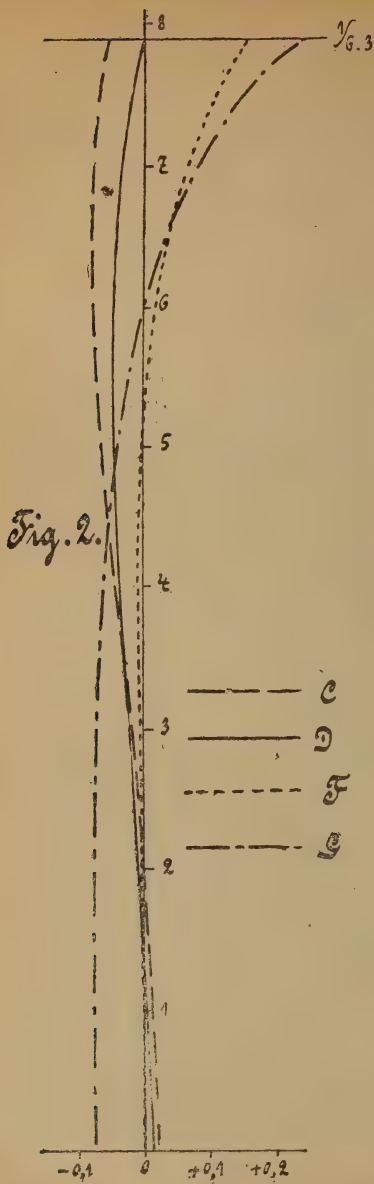
THE PLANAR WITH DIMINISHED SECONDARY SPECTRUM.

By DR. RUDOLPH.

(Translated from the "Photographische Correspondenz.")

By the combination of two kinds of glass of the ordinary type in the construction of an achromatic lens, it is impossible to unite more than two colours completely. The colours, which are not united, form a colour fringe to the image, and this is called the secondary error of colour. The residuary error depends upon the fact that the dispersion of the two glasses is not proportional for the various regions of the spectrum. The secondary residuum of colour may be corrected by means of three kinds of glass with different range of dispersion, or by means of two or more kinds of glass with proportional range. In the construction of photographic lenses hitherto, the latter method in most cases is the only one which has been used with advantage. When Professor Abbe made known the new forms of microscope objectives in 1886, by a communication to the Jenaer Gesellschaft für Medicin und Naturwissenschaft, concerning the improvement of the microscope, by means of new kinds of optical glass (see Report of Transactions, July 8, 1886), he introduced a new nomenclature. These lenses, in which the secondary spectrum has been eliminated and the spherical aberration corrected for two colours, are now universally known as apochromats, or objectives perfectly corrected for achromatism.

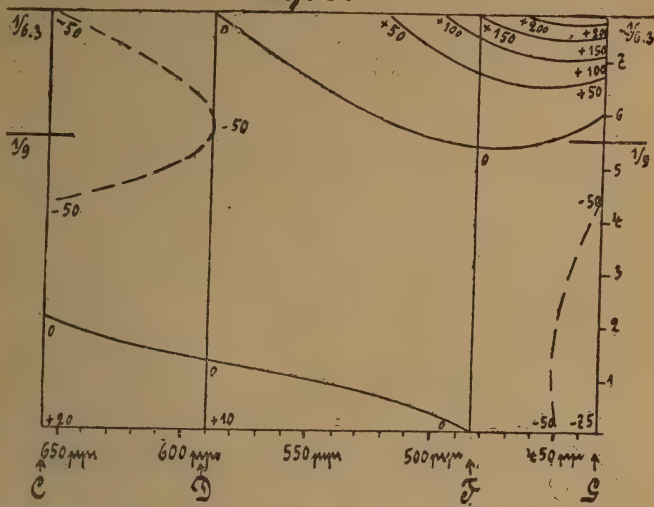
So far as I am aware, apochromatic photographic lenses were first introduced by the firm of Carl Zeiss, and this was as early as 1890. The construction was planned by Professor Abbe, and the calculations were made by me. The lenses were called triplet apochromats, and are still valued by many amateur and professional photographers for their remarkable central definition. These and the achromatic triplets were regularly manufactured, and by request of Messrs. Köhl and Co., of Frankfurt, some of larger size were made for copying. The same firm also used the triplet apochromat for some time for making negatives for three-colour printing, but the technical results did not come up to the expectations which had been entertained. Moreover, it was necessary to protect the flint glass used in the triplet from variations in temperature and from abnormal atmospheric conditions. The triplet apochromat thus fell into disuse. In 1896, however, I succeeded in constructing the planar, a lens pre-eminently suitable for copying purposes, and shortly afterwards the glass manufacturers, Schott and Genossen, produced pairs of glasses of satisfactory permanence, with diminished secondary spectrum, which could easily be used in the construction of the planar type. This induced me to return to the older experiments, and in the spring of 1899 I was



enabled to place at the service of specialists in three-colour printing the apochromatic planar. The first specimen was tested by the Photographic Department of the Academy of Arts at Leipsic. The difficulty of manufacturing glass of suitable quality stood in the way of the lens being made generally known, but the firm of Carl Zeiss began by submitting special offers, in reply to inquiries for copying lenses that might be required for special purposes. Many apochromatic planars have been ordered and supplied in the interim, and the manufacture of the glass being apparently placed upon sure and regular lines, the firm of Carl Zeiss have now included in their catalogue, for general publication, this important lens for three-colour printing.

The advantages of the apochromatic planar for all kinds of copying are many. The achromatic planar was remarkable for its high degree of

Fig. 4.

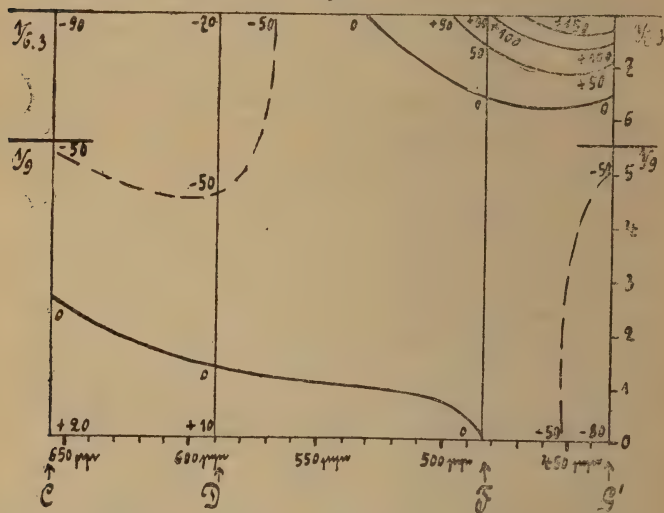


spherical and anastigmatic correction, as shown in Dr. von Rohr's article in Eder's Jahrbuch for 1898, p. 70. The spherical correction was accomplished with relatively very small intermediate errors (zones) for an aperture of $f/5$, and the lens could be used with long focus and large aperture of copying line subjects. The specimen prints which have been shown by the firm of Zeiss at various exhibitions demonstrate that a planar of 410 mm. focus and aperture $f/5$, when stopped down to $f/7$, will reproduce a line subject sharply upon a plate 30 by 40 cm., and that a plate 40 by 50 cm. can be sharply covered at $f/12.5$. Every optician knows that the difficulty of producing a lens with fine definition increases considerably with the length of focus and the size of the plate. The planar was the first lens produced for line work that would give good definition at $f/18$ for a plate 1 metre square or more. For this purpose a focus of 100 to

130 cm. sufficed. Lenses of this description are regularly made by the firm of Carl Zeiss to order, and they have been favourably received by those who are engaged in work of this nature.

Now that crown and flint glass with approximate proportional range of dispersion can be had, their use in the construction of the planar has brought copying lenses to an appreciably higher state of perfection, through the introduction of the apochromatic planar. The apochromatic planar gives finer definition in consequence of better chromatic correction, and is therefore easier to work with. There is, however, special advantage in using it for three-colour printing, as the three primary colours are united by the apochromatic planar at almost the same distance, and have the same focus. The exposures may therefore be made for the three colours at one and the same focus, and thus there is no fear that the three

Fig. 5.



tion. The quantity of light is compressed into a smaller area. It is therefore possible to reduce the exposure. This fact has already been recognised by those engaged in this branch of work, and the use of apochromats will conduce to progress in the domain of astronomical research.

In the autumn of 1900 Messrs. Voigtländer and Son, of Brunswick, brought out an apochromatically-corrected collinear for copying purposes. The nature of the correction of this lens was described by Dr. Harting in the "Photographische Correspondenz" (1901, p. 522). This collinear is well corrected for spherical aberration, and has a good anastigmatic field at $f/9$, judged by the curves which are given. The secondary spectrum is satisfactorily eliminated. It may, therefore, be of interest to give the curves of the apochromatic planar. The data of construction relating to this lens are also given below. The spherical correction is almost free from zonal error for an aperture of $f/6.3$, and anastigmatic flatness of field is attained, with almost imperceptible intermediate errors, for a field of about 60 deg. The secondary spectrum is very small for the entire aperture of the objective, $f/6.3$.

Table I. gives the radii (r), the lens thicknesses (d), the separation of the lenses (l), and the distance of the stop from the lens surfaces (b).

TABLE I.

Radii, Thicknesses, and Separations for the Apochromatic Planar $\frac{f}{6.3}$
focus = 100 mm.

$r_1 = +24.77$	$r_6 = -17.35$	$d_1 = d_6 = 3.22$
$r_2 = +61.27$	$r_7 = +22.58$	$d_2 = d_5 = 2.58$
$r_3 = +30.32$	$r_8 = -27.09$	$d_3 = d_4 = 0.97$
$r_4 = -22.58$	$r_9 = -57.41$	$l = l_1 = 0.065$
$r_5 = +17.35$	$r_{10} = -25.67$	$b = b = 5.55$

Table II. gives the figures indicating the kinds of glass used in the construction of the lens. The figures, under the headings $n_F - n_D$ and $n_{G^1} - n_F$, represent the values of the quotients of $\frac{n_F - n_D}{n_F - n_C}$ and $\frac{n_{G^1} - n_F}{n_F - n_C}$. The curves given in Fig. 2 show that the small divergence in the three values $\frac{n_{G^1} - n_F}{n_F - n_C}$ has scarcely any perceptible influence on the final result.

For each of the colours of the spectrum, C, D, F, and G^1 , the path of a ray parallel to, and infinitely near the axis, was calculated by means of logarithms carried to six decimal places. This was repeated for rays parallel to the axis, taken at three different distances from the centre. By the last distance of intersection, we understand the space between the back surface of the lens and the point where the axis is cut by a ray of the colour λ , and height of incidence h , after it spassage through the lens. This is denoted by $s_\lambda h$. The values $s_\lambda h - sF, O$, that is to say, the aberrations of the distances of intersection, from that of the intersection of the green axial ray, are multiplied 100 times, and used as the abscissæ in Fig. 2, whilst the ordinates represent heights of incidence multiplied 20 times.

TABLE II.

Kinds of Glass used in the Apochromatic Planar $\frac{f}{6.3}$, focus = 100 mm.

KIND OF GLASS.	n_D	$n_F - n_C$	$\frac{n_D - 1}{n_F - n_C} = v$	$n_F - n_D$	$n_G - n_F$
L_1 and L_4	1.61023	0.01088	55.8	0.00768	0.00822
Heaviest Baryta Crown.	..	..	..	0.708	0.572
L_2 and L_5	1.58008	0.00877	60.1	0.00618	0.00497
Silicate Crown.	..	..	..	0.705	0.567
L_3 and L_4	1.52352	0.01022	50.9	0.00721	0.00576
Telescope Flint.	..	..	..	0.705	0.563

The curves in Fig. 2 show the following facts. The foci of the paraxial rays, comprised within the entire visible spectrum, are brought together within a space of 0.1 mm. This space, or the location of all the foci, diminishes as the height of incidence increases, until a minimum of 0.05 mm. is reached, at 4.5 mm. height of incidence, where they begin to diverge slowly. At 6 mm. height of incidence the space widens once more to 0.1 mm., and it is situate exactly above the space of equal size, including the foci of the rays at the axis. Up to this point all four curves may be enclosed by a rectangle with the space to which we refer, as base. This means that for 6 mm. height of incidence, or relative aperture of $f8.3$, the incident rays parallel to the axis, for all colours of the visible spectrum, are united in such a manner, after refraction by the lens, that their intersection with the axis is comprised within a space of 0.1 mm. This space, of course, increases more rapidly for larger apertures, but at $f6.3$, or 8 mm. height of incidence, it only amounts to 0.3 mm. Such a result can only be attained by correcting the spherical aberration very carefully for each colour. Spherical correction, as understood in von Rohr's "History of the Photographic Lens," is attained for yellow sodium light (D line) at an aperture of $f6.3$, and the remaining zonal errors are as small as in the best corrected lenses of the same aperture, which do not possess an anastigmatic flat field. This may be clearly seen by comparing Fig. 3 with the curves of the corresponding older lenses given in von Rohr's book, according to the same scale. The dotted curve in Fig. 3 represents, as in von Rohr's work, the aberration of focus for the various zones.

By means of Fig. 2 we are able to construct Table III., showing the amount of spherical aberration.

Fig. 2 represents the spherical aberration in the various zones for four definite colours of the spectrum. It can easily be seen that this method is not suitable for showing the condition of the correction for any number of individual colours of the spectrum. To show this graphically, we may turn to the method adopted by Dr. von Rohr in his book "Theorie und Geschichte des Photographischen Objectivs," Berlin, 1899, p. 66, who was the first, so far as I am aware, to apply it to optics.

The wave-lengths λ determining the colour of the light, are used as abscissæ, and an interval of 89 mm. is selected for that part of the spectrum between the red C line ($\lambda = 656 \mu\mu = 0.000,656$ mm.) and the blue G' line ($\lambda = 434 \mu\mu$). The ordinates show the height of incidence of the ray multiplied eight times. In this way each point in the drawing represents two values (λ and h), and *vice versa*, each two values (λ and h) are shown by a point.

TABLE III.

Comparison of the differences of intersection at the axis $s_{\lambda} k - F, O$, expressed in millimetres. Apochromatic planar $\frac{f}{6.3}$, focus = 100 mm.

Height of Incidence, h , in mm.	$s_C - s_{F,O}$	$s_D - s_{F,O}$	$s_F - s_{F,O}$	$s_{G^1} - s_{F,O}$
0.0	+ 0.02	+ 0.01	0.00	- 0.08
1.0	+ 0.01	0.00	0.00	- 0.08
2.0	0.00	- 0.01	0.00	- 0.075
3.0	- 0.02	- 0.02	- 0.005	- 0.07
4.0	- 0.045	- 0.04	- 0.01	- 0.06
5.0	0.065	- 0.045	- 0.005	- 0.04
6.0	- 0.075	- 0.05	+ 0.02	0.00
7.0	- 0.075	- 0.035	+ 0.065	+ 0.08
8.0	- 0.055	- 0.00	+ 0.16	+ 0.8

Fig. 2 was examined, and for each of the four curves the points were found, which are—5 mm., 0 mm., + 10 mm., + 15 mm., and + 20 mm., from the perpendicular axis erected upon the zero point. The corresponding heights of incidence were noted. As stated above, rays falling upon the lens, parallel to the axis, at these heights of incidence, show a difference of intersection with the axis, measured from the back surface of the lens of $s_{C,h} - s_{F,O}$; $s_{D,h} - s_{F,O}$; $s_{F,h} - s_{F,O}$; $s_{G^1,h} - s_{F,O}$, or - 0.050, 0.000, + 0.050, + 0.100, + 0.150, and + 0.200 mm., when compared with the green ray at zero. The heights of incidence (h) were marked upon the perpendiculars erected upon the points C, D, F, G', in Fig. 4, and the values of $s_{C,h} - s_{F,O}$, &c., were added in units of 1μ . Finally, the points bearing the same numbers were united by means of curves.

The values of $s_C, O - s_{F,O}$ &c., were taken from Fig. 2, or the first line of Table III., and written against the points C, D, F, and G'.

Fig. 4, constructed in this manner, serves the same purpose as Fig. 2, as the latter can be constructed from the former; but it is more useful. We can say with a degree of certainty, which is only qualified by the slight inexactitude of the form of the curves, that the same value, $s_{\lambda,h} - s_{F,O}$, which is placed against the curve, belongs to each point (h, λ) on the given curve. In other words, rays parallel to the axis, incident upon the lens at the height h , with light of the wave-length λ , cut the axis at the same point, after passing through the lens, if the two values belonging to them (h, λ), in Fig. 4, determine points lying upon the same curve, and the value of the curve shows how many thousandths of a millimetre the point of intersection is distant from the focus of the paraxial green rays. For example, this focal point is cut by the incident green rays, parallel to the axis, of wave-length $\lambda = 530 \mu\mu$ and 6 mm. height of incidence. The point upon the drawing, corresponding to the pair of values, $\lambda = 530 \mu\mu$ and $h = 6$ mm., will be found upon the curve for which $s_{\lambda,h} - s_{F,O} = 0$. Fig. 4 also serves for another convenient representation upon a large scale, resembling that used by persons in the study of maps of ocean depths and mountain altitude. According to the same method, they

indicate by latitude and longitude the inclination of depth below, or height above, the sea level of two constantly changing critical localities.

Let us suppose that the curves in Fig. 4 are as much below (— sign), or as much above (+ sign) the plane of delineation as the figures which are given indicate. Between the curves in the drawing suppose a continuous surface. In the present case it would resemble a mountain saddle. The depression would be situate near the centre of the drawing. The ground would rise towards the right at the top, and towards the left at the bottom. It would fall towards the left at the top, and towards the right at the bottom.

The distance of any point at the surface from the plane of representation thus gives the aberration of the distance of axial intersection, as compared with the axial green ray for the wave-length λ (abscissa), and the height of incidence h (ordinate), determined by the point on the surface.

The large field in the middle of the drawing, bounded by the curves 0 and —50, represent all the incident rays (h, λ) parallel to the axis, whose points of axial intersection are compressed within 0.05 mm., measured in the direction of the lens from the focal point of the green axial ray. The size of this field shows that these rays form the bulk of those constituting the white light transmitted at full aperture, and that excellent central definition is attained.

Fig. 5 is a similar representation of the focal differences $\lambda, h - F, O$. The great similarity of this collection of curves with that for the differences of intersection shown in Fig. 4, is a guarantee for the sharp definition of points in the object, which are outside the axis. The evenness of the good correction of the focal aberrations for the various colours (λ) implies that there are practically no differences of magnification.

In conclusion, we draw attention to Fig. 6, which represents the correction for astigmatism for yellow sodium light, according to the method which has become familiar through von Rohr's work. The quantities given in Table IV. are taken from this drawing.

TABLE IV.
Correction for astigmatism and curvature of field.

Apochromatic Planar $\frac{f}{6.3}$ focus = 100 mm.

Front Angle w	Δ eq.	Δ merid.	Δ me — Δ eq.	$\frac{1}{2}(\Delta \text{ ml} + \Delta \text{ eq.})$
0°	0.0	0.0	0.0	0.0
5°	—0.1	—0.1	0.0	—0.1
10°	—0.3	—0.25	+0.05	—0.28
15°	—0.5	—0.4	+0.1	—0.45
20°	—0.8	—0.5	+0.3	—0.65
25°	—0.6	0.0	+0.6	—0.3
30°	+0.2	+1.2	+1.0	+0.7

The values, Δ eq., give the differences of focus for the equatorial pencils, and the values Δ merid., those for the meridional pencils compared with the ideal focal plane. The values Δ merid. — Δ eq. are the corresponding astigmatic differences, and the values $\frac{1}{2}(\Delta \text{ eq.} + \Delta \text{ merid.})$ the measure of the mean curvature of field.

OPTO-TECHNICS.

(A lecture delivered at the Society of Arts by PROFESSOR SILVANUS P. THOMPSON.)

I.

Though we often hear of the magnitude and growth of the engineering industries, of the chemical industries, and of the electrical industries, we seldom hear of the optical industries, or of their importance in the national life. Few persons have probably ever considered what are the optical industries, how varied in character, and of what magnitude. Yet they are no inconsiderable part of those industries—using the word in its widest sense to include trading as well as manufacturing—which, like engineering and the chemical and electrical trades, are based upon science and scientific invention. According to the London Post Office Directory, there are 216 firms described as “opticians,” within the postal area, which excludes most of the suburbs. But, in addition, there are numerous other trades, amongst which are glass manufacturers, glass grinders, glass polishers, glass silverers, looking-glass makers, magic lantern makers, magic lantern slide makers, microscope makers, micrometer makers, optical turners, optical-case makers, opera-glass makers, photographic apparatus makers, photographic frame makers, photographic lamp makers, photographic lens makers, photographic material makers, photo-printers, photo-gravurists, photo-lithographers, spectacle makers, spectacle-case makers, spectacle lens makers, and telescope makers. This category does not include the makers of levels, theodolites and surveying instruments, or photographers or photographic artists, nor does it include the purely professional class of ophthalmic surgeons. If one were to include the employees of the optical shops and factories, the warehousemen, shopmen, assistants, foremen, fitters, clerks, and labourers, the total number of persons employed in the aggregate of the optical industries would be found to be very great. It is impossible to state it with even approximate accuracy. It cannot be less than 15,000 to 20,000 persons in the London district alone. What the number may be in Great Britain of simple opticians, or of opticians who combine the trades of jeweller and optician, or of pharmacist and optician, I do not know. But, merely classifying together those whose optical work consists chiefly in dealing with spectacles (many of them also trading in opera-glasses, telescopes, microscopes, cameras, etc.), and including assistants brought up to the trade, the number of opticians in the trade must be at least 10,000 within the United Kingdom. While it is true that many of these are mere traders, it cannot be too strongly stated that for all of them, unless employed as labourers, errand-boys, or simple attendants, a certain amount of optical knowledge is an absolute necessity. All those in particular who have to sell, supply, fit, or adapt spectacles to customers, must have a real working knowledge of the first principles of optics, of the properties of lenses, and of the optical functions and relations of the eye as an instrument. This implies a certain scientific training. In the case of the optical manufacturers and their employees, a further training in optical science is necessary; and for the masters and foremen of the optical factories this training must be a highly specialised one, involving both theory and its technical applications. For them, above all, a technical training in optics is a prime necessity: and it must be thorough.

Having thus briefly glanced at the optical industries themselves, let us take a similar brief review of the science of optics which lies at the basis of all these industrial and commercial developments. Optics, the science of light and its properties, is concerned in the first place with the laws of refraction and of reflection—mainly with the former. The essential fact, both in the refraction and in the reflection of light, is angular deviation. The light which was proceeding from some source, in some particular direction, is, when refracted or reflected, caused to proceed in some other direction at an angle with its former path. It is fundamental in this most elementary part of optics to know the simple physical facts about the angles concerned in refraction and reflection, and their relation to the surfaces at which the light is so refracted or reflected. The physical fact that in the act of refraction, ordinary light is dispersed into a series of coloured constituents, is also a fundamental point. Now, refraction occurs whenever light passes from one optical medium to another, as when, for example, light passes from air into glass; and since different kinds of glass act differently from one another, any complete grasp of these simple, physical facts will involve some further knowledge. It will, in fact, necessitate a knowledge of optical glass: its varieties, their respective virtues and defects, their refractivity, their dispersivity for colours, the degree of rationality or irrationality of their dispersion. For technical purposes it is also needful to know how the various kinds of optical glass differ amongst themselves in density, hardness, and in liability to atmospheric deterioration.

Now, to study but the first of these points, the refractivity of glass, requires a certain amount of preliminary knowledge. For, since the index of refraction is measured by, and defined as a ratio between, the trigonometrical sines of certain angles, its proper comprehension is only possible to those who have already comprehended what is the meaning of the sine of an angle. So there must be a basis of mathematical knowledge. Also in technical work it is vital that refraction should be studied by the use of the instrument appropriate for the exact measurement of angular deviations, namely, the "optical circle," also sometimes called the "spectrometer." Further, since the power of any lens or combination of lenses depends not only on the refractivity of the glass or glasses used in its construction, but on the curvatures of its surfaces, it is necessary as a preliminary to know, and be familiar with, the definition of "curvature"—a purely geometrical conception—and for technical purposes it is necessary to be acquainted with the proper instruments for measuring the curvatures of surfaces, the so-called "spherometers," and with the methods of using them and of working out the calculations appropriate to them.

We see, then, that as a necessary foundation for any sound technical knowledge of optics, there are at least four things essential:—

(1) A knowledge of certain physical facts and laws relating to the angular deviations of the paths of light in being refracted or reflected.

(2) A knowledge of the varieties and properties of optical materials, particularly of optical glass.

(3) A knowledge of elementary mathematics up at least to the trigonometry of one angle, and a certain facility in using algebraic and trigonometrical formulæ in calculation, and in using mathematical tables.

(4) A working, personally acquired, knowledge of the instruments that are used in the optical measurement of angles, and in the measurement of curvatures of surfaces.

It would, perhaps, be more rational to put these four fundamental requirements in a different order.

(a) Mathematical knowledge and practice in calculating.

(b) Knowledge of the general physical properties of light, refraction, dispersion, reflection, etc.

(c) Practice in using, and comprehension of the principles of such optical measuring instruments as the spectrometer and the spherometer, also the focometer and other instruments.

(d) Knowledge as to the optical properties of glass of different kinds, and of a few other substances used in optical work—quartz, flint, Canada balsam, water, cedar-wood oil, etc., acquired by observation with measuring instruments. The first of these can be taught in the class-room, or less advantageously learned from books. The second can be taught and learned in like manner, but ought, from beginning to end, to be studied by the aid of experiments. The third requires the use of instruments of precision, and is most appropriately followed in a properly-equipped optical laboratory. The fourth, provided the other three have been really learned, not crammed, nor skipped, may be acquired from tabulated recorded results of observation, accompanied preferably by reference to a set of specimens.

He who has been trained, or has trained himself, in these four elementary parts of optical science, will have acquired a knowledge of lenses, prisms, and mirrors, and of the dependence of their respective optical properties upon their geometrical shapes, and the material of which they are constructed. "Matter" and "form"—the old battle-words of Aristotle and the schoolmen—both must be studied, because both are essentially concerned in the properties of any and every lens or prism. The formulæ for the power of any lens or prism, always in every case contain two factors, one depending purely on the physical properties of the glass, the other purely on its geometrical shape. Hence the fundamental necessity in optical study of *experiment* to supply the first, and of *mathematics* to express the second. But he who has mastered this bit of elementary optics has yet much to learn.

Our eyes, being optical instruments, and instruments liable to many grave defects as well as to diseases, it is vital that the optician should acquire a sound knowledge of the optical properties of the eye, and of its defects as an optical instrument, even though he may never have to study its diseases, or be required to know anything about their treatment or cure. His first business with the eye is with its optical construction, its adjustments, and the use of spectacles to correct its optical defects. This study of the eye involves a little elementary anatomy and a little elementary physiology; but more than either, it involves a comparative study of the eye with other optical instruments; best of all, a comparison with the camera, since the eye-ball is itself a camera of most exquisite construction, with lens in front, with automatic iris diaphragm, with automatic focussing by the aid of an auxiliary lens behind the diaphragm, and with a sensitive film at the back whereon the images are focussed. Every young optician ought to assist his own studies by getting a sheep's eye or a cow's eye to cut up with his own hands. If he rests content with looking at a book instead of making friends with the nearest butcher, he throws away a chance. But every young optician will find that his knowledge of the eye will be woefully incomplete if he stops short here. Nothing will better help him to realise the defects of the eye than to study the defects of other optical instruments. A single common convex lens, the fatter the better, will provide him with a highly defective optical instrument. For he has yet to learn a new chapter in optics.

The study of the various aberrations of lenses will go a long way toward perfecting the training of an optician. He cannot study them without both experimenting and thinking. He will not understand them unless he has really grasped the more fundamental parts of optical theory. To understand aberrations, he must perforce learn, if he does not already know, the bare essentials that have been already mentioned. And when he comes to study the defects of his lens by trying its optical performance on different objects, trying to get by its means sharp images of luminous objects, such as bright points, bright lines, bright pictures, he will discover, or he may be taught, that the defects which the scientific men call aberrations fall into two classes—one depending on *material*, the other depending solely on *form*. He will learn that the defect which causes the image of a bright white point to be surrounded with coloured margins (which the learned call “chromatic aberration”—is due to the material—the glass—and its unequal refractive action on the differently-coloured constituents of light. If he pursues the subject more deeply, he will discover that there are three different sorts of chromatic aberration, one affecting the position of the image, another affecting the size of the image, and a third, a residual one, which occurs when a second lens, made of a different kind of glass, is applied to reduce or correct the first sort. He will, in this way, be led to consider how an achromatic lens can be made out of two lenses; and if his teacher or his text-book is up to date, he will learn that there are two sorts of achromatic lenses, an old sort in which the two kinds of glass were a light brown and a dense flint; and a new sort in which there is a dense crown and a light flint. He will also learn that there is some advantage in combining three kinds of glass (or two kinds of glass with a third material, flintspar) to form a still more perfect *apochromatic lens*. When he turns to those defects which depend not on material, but on form, he will find a fine complication awaiting him. Prolonged studies of clever opticians in time past have enabled us to classify the aberrations due to the spherical curvatures of the lens surfaces under five categories. There is *central aberration*, preventing accurate focussing in the middle of the field; there is *coma* (or zonal aberration), causing blurred images at the margins. There is *radial astigmatism*, making the images of points into little lines; there is *curvature of the image*, preventing it from being all in focus at once on a flat screen; and lastly, there is *distortion* of the image itself, causing straight lines to look curved. That makes eight defects in all, to which there must be added yet one more—the chromatic difference of the spherical aberration. And if he would go on to learn how these nine defects—three kinds of chromatic aberration, five kinds of spherical aberration, and one mixed sort—are to be cured in the design and construction of a camera lens, he will become an accomplished optician truly.

But long before he has mastered the theory of these aberrations he will necessarily have encountered a great deal of other optical information. He will have found a whole class of phenomena dependent upon the size of the light waves. The *diffraction* phenomena, which occur when light is sent through small apertures, will have been noted. He will have come across the colours of thin films, due to the *interference* of light, the typical case of which is Newton's rings. He will have been led, therefore, to study interference. He will have learned the significance of the various orders of colours in Newton's rings. Possibly he may have had to acquaint himself with the investigations of Fresnel, and to study the wave theory in general. He ought to work with the *interferometer*, and measure wave lengths. Now that *diffraction gratings*, thanks to the labours of Nobert, Rayleigh, Rowland, and Thorpe, are to-day made in splendid perfection, and cheaply, he will have made observations on the diffraction spectrum,

and will have compared it with the spectra produced by prisms of glass. In studying prismatic spectra, he will have found that the lines of the spectrum are spaced out in different ways by different kinds of glass. All kinds of glass crowd up the red region of the spectrum, as compared with the equable spacing observed in the diffraction spectrum, while some kinds of glass produce a relative crowding of the spectrum in the yellow and green regions more than other kinds of glass. This *irrationality* of the spectrum will naturally have prepared him to learn that there are some substances which produce a spectrum which is *anomalous* in having the colours in a different order—in which, for example, red light is refracted more than blue light, and in which red and blue are both refracted more than green. Then he will also discover that there is another great class of beautiful phenomena which depend on the particular direction in which the light waves may be vibrating—the phenomena of *polarization*, so-called, and he will have met with double refraction.

Further, he will have been led to inquire into the laws governing the amount of light that is received from a given source at different distances, and those which govern the measurement of the brightness of lights. The subject of *photometry* will thus have come within his range of knowledge. Finally, his attention will have been drawn to various *optical illusions*, and he will have had to consider sundry physiological properties of the eye, the *theory of colour-vision*, with its bearing on the tri-chromatic photography and three-colour printing, as well as the facts of *binocular vision*, upon which the stereoscope is based.

Now, considering that every optician above the grade of a mere workman ought to know something of all these things, and that the competent optician must be master of a great many of them, the question arises, how is his education to be carried out? How and where can he acquire all the varied scientific information, with its experimental and mathematical basis?

In another branch of applied science—that of electrical engineering—a very similar problem is presented. How is the young electrician to learn the technics as well as the practice of his trade? Well, in that case, it has been recognised for twenty years that a proper systematic training is requisite, and provision has been made for it. In the factory, and in the drawing-office, as apprentice or pupil, he has to work at the constructive side, and learn by his own hands what electrical engineering is. But all over the country there are classes, schools, and technical colleges, to which he can resort for instruction in the physical phenomena, for teaching in the theory, and for exercise in the application of the theory to practice. Electrical laboratories have been organised and equipped at great expense, that he may learn electrical measurement and electric testing, and verify for himself the known laws of electricity. In a word, the subject of *electrotechnics* is a recognised branch of education for the trade of electrician or electrical engineer.

But what is there to correspond for the education of the optician or optical engineer? Where are the classes in optotechnics? Let us see how far provision exists for those four elementary requirements which were laid down a few moments ago.

(a) The mathematics can be taught by the secondary schools; adequately taught, if only they will adopt sensible reforms in mathematical teaching, and abandon the superstition that dragging a boy through the logical toils of a fossilised Euclid is the way of either teaching him geometry or of making him think.

(b) The physical facts and laws of elementary optics can be taught also by the secondary schools, or at least by those secondary schools which have proper provision for experiments in the lecture-room and in the laboratory. Very few, even of the organised science schools, have, how-

ever, proper equipment for the experimental teaching of optics. It is taught as a branch of general physics or of the hybrid "subject," Sound-Heat-Light rolled into one; and seldom has the teacher himself had any training in practical optics. The ordinary science teacher is not in the habit of describing the powers of lenses in the international unit, the *dioptric*. He is usually innocent of any knowledge of Gauss's method of treating lens problems. In short, his optical knowledge is largely circumscribed within the elementary university text-books of the last half-century—books written by university dons for university students. Nevertheless, with proper experimental appliances, such lectures may serve a very useful purpose; and the future optician will be none the worse for elementary instruction in other branches of physics, including heat, acoustics, and electricity.

(c) Practice in optical measurement, with the use of the spherometer and of the optical circle as goniometer and spectrometer, together with practice in measuring focal lengths and the like, can only be acquired in an optical laboratory, or in the optical department of a physical laboratory. While so many of the secondary schools are well equipped for chemical and electrical teaching, it is a matter of extreme regret that so few of them are properly provided with optical appliances.

(d) Acquaintance with the varieties of optical glass, and with the few other transparent bodies used in optical constructions—quartz, Iceland-spar, flint-spar, and Canada balsam—can readily be provided by a small collection of specimens in the museums of the science school. But specimens of optical glass and of spar cut to the shape of prisms for use in the laboratory ought also to be available.

II.

If it be assumed that by a small improvement in the optical equipment of the science schools throughout the country and in the optical information of the science teachers, the above requirements should be fulfilled, then a suitable foundation will be available. But what more is required than this for the teaching of the future optician? Obviously, there remains a considerable technical field, over which even the ordinary optician must extend his mastery. He has yet to acquire much specialised knowledge in relation to spectacles and to instruments. He has yet to study the optical properties of the eye. He will have to master such technical matters as the properties of cylinder-lenses, the properties of spherocylinders, the transpositions of lenses, the properties of the combinations of prisms and lenses, the effects of decentering, all the mysteries of spectacle fitting, and many another technicality of the spectacle trade. All that part he will learn, if he is diligent, in the trade itself, provided the scientific foundation has been properly laid. But if he would make rapid progress, even in spectacle technics, he must study—and this time not Cambridge text-books, but handbooks written by opticians for opticians.

But if this course of training suits the average optician in trade, what about the further requirements in the scientific and technical training of the optical manufacturer? For him a much further and more specialised course of instruction is needed. He must not only be able to grind and polish a lens, but to know how to compute it. Where is he to learn these things? The optical factory will train him in the practical part; but divorced from theory, that training will leave him merely a skilled workman. He will have in the factory to use proof-glasses, with their exquisite optical test, by the coloured interference rings and bands, of the

perfection of the surfaces. The study of interference, diffraction, polarisation, secondary spectrum, absorption coefficients, aberrations—all these things which enter into his daily work ought to be at his finger ends. Where is he to acquire these higher studies in optics? There are books, but how sadly inefficient are even the best books to teach if the instrumental appliances are not at hand! There are lectures in higher optics at the universities: but it is obvious that few of these who are going to enter optical factories can attend the university. Even if they did, they would find university lectures in optics sadly unreal—beautiful, but inefficient for their purpose. Where, then, can the needed training in advanced optical studies be obtained?

This query brings me to the main point of the present paper. I suggest, as the proper solution, the creation of a special technical college, an *Optotechnical Institute*, devoted to the interests of optical science. It would be the counterpart of those colleges, or departments of colleges, devoted to electrical engineering, to which allusion has already been made. This suggestion, which presently I will further explain, does not, however, stand alone. No such educational step is successful without proper preparation of the way. Before any such institute can be carried on with success, much must be done outside; and existing means of preliminary education must be much more fully utilised before such an institute can discharge its proper functions. Every young optician ought now to be preparing for the work of his life by studying mathematics, geometrical drawing, and physics, in the secondary schools and the science schools which exist under the Board of Education. Or, if he has satisfactorily followed such preliminary work, he ought to be studying in special optical classes organised in the technical schools and colleges. Unfortunately, very few such technical schools or colleges have made preparation to hold special optical classes. Even in the larger municipal technical schools, and in the local university colleges, the equipment for teaching optics is very deficient—far in arrears of that provided for the teaching of electricity, or chemistry, or heat. Perhaps the answer of the managers of such schools or technical colleges to such a criticism is that the demand, down to the present, for direct teaching in optics is not such as to warrant them in spending money on the equipment, or in engaging teachers in optics who are possessed of the special qualifications. To teach chemistry or electrical engineering they engage special teachers trained up to their respective professions; and for them they provide apparatus and laboratories. Then why not for optics? One reason is that under the present educational system, or want of system, only those subjects are pushed and fostered which “pay” from the examination point of view. The examination curse, here as everywhere, warps and blights the educational growth.

What, for example, has South Kensington done in the past for the teaching of optics? It has, of course, included optics amongst the branches of physics taught in the Royal College of Science. As a former student of the Royal College of Science, I, for one, can never be too grateful for the teaching in experimental optics there given as a part of the physics course. But it has never entrusted the subject to a special lecturer in optics. It has a special professor of metallurgy, and another of astronomical physics, but none of optics as such. It has further included “light,” along with sound and heat, as a part of Subject VIII., amongst the subjects for the May examinations. For the past thirty years, therefore, sound, light, and heat have been taught together, all over the country, in science classes, for the elementary, advanced, and honours stages. So far so good. But has this met the need for the teaching of young opticians? Let the men in the optical trades answer.

By the kindness of Sir William Abney, the principal assistant-secretary of the Board of Education, I am able to give here the statistics of the

classes held during the last ten years in this triple subject of sound, heat, and light, and of the subject of light in the advanced and honours stages. Originally the triple subject used to be kept up into the honours stage as a triple subject. This, however, was altered, partly, I believe, in consequence of some strictures of mine, a year or two before the period under consideration.

From the figures of Table I., it would appear that the number of candidates in the elementary (triple subject) stage has decreased from 5,162 in 1892, to 949 in 1901. The number who passed has decreased from 3,939 in 1892, to 649 in 1901. It must be remembered that these numbers do not include candidates in training colleges. In the single subject of light, the number of candidates in 1892, in the advanced and honours stages taken together, was 418, of whom 264 passed. In 1901, the number of candidates was 299, of whom 199 passed. Judged by these statistics, it would appear that there is a serious diminution in candidates in the advanced study of light, and a startling diminution in the number of candidates in the elementary stage of sound, heat, and light.

In Table II. we have the statistics, not of examinations, but of classes and students. From these it would appear also that the number of students in attendance dropped from 7,340 in 1892, to 4,596 in 1899, in the elementary subject, while in the advanced subject of light the numbers dropped from 721 in 1892-3, to 251 in 1899. Nor is this the worst feature, for the numbers of classes held in different centres also dropped from 251 to 173 in the elementary (triple) subject, and from 65 to 22 in the single subject of light; and has dropped to about 20 in the present year. I do not mention these statistical facts to blame the South Kensington administration. Surely, if there is one man competent to understand what technical knowledge in optic means, that man is Sir William Abney. Furthermore, the years of this decrease are precisely those during which the control over, and maintenance of these science classes has passed from the control of South Kensington to that of the local municipal bodies, or their technical education boards.

What is the meaning of this reduction? If in 1892 there were 65 classes in advanced light being held in the United Kingdom, why should that number now have fallen to 20? Are there fewer persons desiring instruction in optics now than in 1892? Is less money being spent on science teaching now than in 1892? The very question is absurd. Think of all the technical education grants out of the beer-money now at the disposal of the County Councils; of all the new technical institutes that have been opened; of all the new physics laboratories that have been equipped. No; the cause must be sought for elsewhere. In spite of the great revival in experimental optics since 1896, in spite of the immense spread of popular photography and all the incentives to study optics that have resulted from the forward movement in the optical trades now in full progress, we have a diminution of classes, of students, of candidates steadily going on.

Is not the inference obvious that these classes on "Light," and on "Sound, Heat, and Light" (where light comes in only third!), do not meet the wants of real students of optics; do not suffice to afford to the young men in the optical industry the training they need, and are, therefore, not attended by such men?

I say unhesitatingly, that until the classes in optics are taught by men who have had optical experience, and who teach from a technical instead of an academic standpoint, the decrease here noted is bound to continue.

I specially appeal to the managers, principals, and committees of the local technical schools and colleges on this point. Do opticians attend their classes on light? If not, why not? Has the teacher in charge of

TABLE I.

TABLE GIVING DETAILS OF THE SUCCESSES, &C., IN THE SUBJECTS OF SOUND, LIGHT, AND HEAT, AND OF LIGHT (ADVANCED), AT THE ANNUAL SCIENCE EXAMINATIONS (BOARD OF EDUCATION) 1892-1901 (EXCLUSIVE OF TRAINING COLLEGES).

Year.	Honours.				Advanced Stage.				Elementary Stage.			
	1st Class.	2nd Class.	Failures.	Total.	1st Class.	2nd Class.	Failures.	Total.	1st Class.	2nd Class.	Failures.	Total.
1892.												
Sound, Light, and Heat (Elementary)	..	..	..	..	..	..	..	..	1,54	2,394	1,223	5,162
VIIIb. Light	4	2	16	22	71	187	133	390	..	..	..	..
									Under Old Rules.			
									36	239	143	411
1893.												
Sound, Light, and Heat (Elementary)	..	..	..	..	..	..	..	..	Passes.		Failures.	Total.
VIIIb. Light	1	6	18	25	59	174	233	466	943	..	2,831	3,774
									Passes.	Fail.	Failures.	Total.
1894.									962	1,509	1,110	3,611
Sound, Light, and Heat (Elementary)	..	..	..	..	..	..	..	..	..	..	..	..
VIIIb. Light	6	11	13	30	52	159	178	389	..	..	..	..
1895.												
Sound, Light, and Heat (Elementary)	..	..	..	..	..	..	..	..	1,207	1,318	1,522	4,047
VIIIb. Light	2	9	25	36	49	146	204	399	..	..	..	..
1896.												
Sound, Light, and Heat (Elementary)	..	..	..	..	..	..	..	..	962	570	642	2,174
VIIIb. Light	4	9	26	39	78	187	102	317	..	..	..	..
1897.												
Sound, Light, and Heat	..	..	..	..	..	..	..	..	857	677	1,047	2,581
VIIIb. Light	2	3	18	23	38	118	90	246	..	..	..	..

TABLE I.—(Continued).

		Honours (divided).					Advanced Stage.				Elementary Stage.					
		Part II.			Part I.											
		1st Class.	2nd Class.	Failures.	Total.	Passes.									Failures.	Total.
1898.																
Sound, Light, and Heat .....	..	..	..	..	..	6	18	24	43	113	107	263	520	663	903	2,086
VIIIb. Light .....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
1899.																
Sound, Light, and Heat .....	..	1	..	1	4	14	18	71	155	86	312	529	624	1,064	2,217	..
VIIIb. Light .....	..	1	..	1	..	..	..	..	..	..	..	..	..	..	..	..
1900.																
Sound, Light, and Heat .....	..	..	..	1	23	17	40	15	103	153	271	414	574	1,124	2,112	..
VIIIb. Light	1	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..
1901.																
Sound, Light, and Heat .....	..	1	1	2	2	7	9	51	145	92	288	305	314	300	949	..
VIIIb. Light .....	..	1	1	2	..	..	..	..	..	..	..	..	..	..	..	..

the class himself any knowledge of the technics of optics? If not, why was he put there in a false position? A technical subject demands a technically-trained man.

Further, I appeal for the creation of proper optical laboratories in the science schools, that the teacher may have a fair chance of training his students.

Perhaps you will say to me, Why make these criticisms and this appeal, before setting our own house in order? The City and Guilds of London Institute for technical education took the lead twenty years ago. It built the first two technical colleges—the oldest one at Finsbury, and the largest and best equipped one at Kensington. It, from the first, made large and generous provision for the teaching of *electro-technics*; why has it not made provision for the teaching of *opto-technics* also? There are certain reasons why these things have not been done, but for these I disclaim all responsibility. So far back as 1886, I made a formal proposition to establish, under the City and Guilds' Institute, an optical laboratory, which was indeed to be opto-technical, since it was to be equipped, not only with optical measuring instruments such as I have mentioned above,

for the optical testing of prisms, lenses, plane-surfaces, and optical instruments, but also with experimental optical tools for grinding and polishing. The suggestion was considered, and put aside, for reasons, doubtless sufficient to the governing body of that date, the main reason being that the main building at Finsbury was already acknowledged to be too small for the purposes of chemistry, engineering, and electro-technics, for which it was built. Two years later, when the Charity Commissioners were considering the establishment of educational institutes out of the funds of the City Parochial Charities, I renewed my suggestion. I sent to the Commissioners a proposition to found in London, preferably in Clerkenwell, an optical institute, specialised for the optical industries, and with laboratory equipment as before. My idea was that this should perform for the optical industries the same kind of function

TABLE II.

NUMBER OF CLASSES AND STUDENTS UNDER INSTRUCTION IN SOUND, LIGHT, AND HEAT (EXCLUSIVE OF TRAINING COLLEGES.)

Session.	Subject VIII. Sound, Light, and Heat. (Elementary Stage.)		Subject VIIIb. Light. (Advanced Stage and Honours.)	
	Classes.	Students.	Classes.	Students.
1891-1892	251	7,430	†	—
1892-1893	232	6,602	65	721
1893-1894	264	6,635	70	893
1894-1895	263	7,186	56	884
1895-1896	240	5,881	41	578
1896-1897	241	5,425	47	680
1897-1898	210	5,636	32	363
*1898-1899	173	4,596	22	251
†1899-1900	—	—	—	—
†1900-1901	—	—	—	—

as the electro-technical laboratories at Finsbury were performing for the electrical industries in London. Again my proposals were put aside. The Commissioners were at that time strongly holden by what I hope I may without offence call polytechnic fever. Their one idea was that all these institutes (except the City of London College) should be made as mixed as possible, recreation and miscellaneous, non-literary instruction being organised in all without distinction. In vain did I point to the unwisdom of this course, and to the preferable course of concentrating the technical teaching in special centres of industry, instead of teaching everywhere smatterings of everything. Instead of *Polotechnics*, I wished to see *Monotechnics*; for engineering at Battersea; for building trades in Islington; for printing trades in Fleet Street; for plumbing and tanning in Bermondsey; and for optics in Clerkenwell. I was not listened to; and the polytechnic idea prevailed. I had the honour of reading a paper on

* The figures for this Session are exclusive of those for Scotland.

† These classes are in addition to those held in Schools of Science since 1896. The number of these classes rose from 1896, from about 20 to 220 this year (1902), so that in the year 1898 at least 180 classes in all were held on "Light." The total number this year is probably about 250 respectively.

‡ The figures for these two Sessions are not available.

this topic in this very room on June 17th, 1897, when I expounded the monotecnich idea. Since that date much has happened. The beer-money added to the funds of the City Parochial Charities has enabled the Technical Education Board of the London County Council to build their twelve Polytechnics, with the work of which you are familiar. That work, admirable as it is in so many ways, has, I am convinced, not been of one-half the value it would have been to the community had these institutes been organised on a more rational plan. Of all of them, the one which has been, so far as I am able to judge, the most successful is that in Bolt Court, Fleet Street, which differs from all the others in being a monotecnich for the printing trades. Can any other one show an equal influence on any trade? I do not forget how the Borough Road Polytechnic has specialised itself in tanning, in connection with the Herold's foundation, nor how engineering has been developed in Battersea; nor, least of all, do I overlook the circumstance that the Northampton Institute, in Clerkenwell, has now for some years considerably specialised its work, and has organised *inter alia* an admirable course of teaching in real optics, and equipped a laboratory therefor. It has, indeed, gone some way toward realising my suggestion for the creation of an Opto-technical Institute. The value of its work is not yet half appreciated; every year will see its reputation increase. Success in each of these cases has resulted from concentration of effort on a definite technical aim. In fact, it is not too much to say of the London polytechnics, that the less they have had of *poly*, and the more of *technic*, just so far have they benefited the industries.

But while these numerous technical institutes have been growing up in the provinces, as well as in London, another movement has arisen. The opticians themselves have begun to organise themselves in three separate ways for the improvement of the scientific qualifications of their own trade. In historic order these are as follow: (1) Examination and certification of opticians by the British Optical Association; (2) examination and certification of opticians, by the ancient guild known as the Spectacle Makers' Company; (3) the foundation of the Optical Society. As I have had the honour of being associated from the first with the Spectacle Makers' Company, I will merely say that its aim has been to stimulate opticians to acquire proficiency in the technics of their craft by offering a diploma and fellowship in the company to those who succeed in passing their examinations. The subjects comprised are elementary mathematics, general elementary knowledge about light and heat, simple geometrical optics, mainly with application to lens problems and to the eye as an optical instrument, errors in the refraction of the eye and the use of spectacles, spectacle fitting, together with a proficiency in some special branch, such as microscope, camera, optical lantern, or sextant, etc. For masters and assistants of many years' standing, a modified examination that does not include mathematics or special instruments has been adopted. During the four years that this examination system has been at work 318 such diplomas in optics have been granted by the company on examination, in addition to 46 honorary diplomas issued by agreement to certain others who had previously been examined by the British Optical Association. Four years' experience with the examinations of the Spectacle Makers' Company has shown me that while the stimulus of the work has been of great benefit in the optical trades in inciting the younger members to read up some of the principles of optics, yet the organisation for the training in laboratory and class-room of these young opticians is very unsatisfactory. To few of the candidates—and they come not only from London, but from all principal towns—does it seem ever to have

occurred even to inquire whether mathematics and optics were taught at the nearest technical school or science school. Of the London candidates, hardly any come from any of the technical institutes, the Northampton Institute being the one exception. Many of them seem to think that six months' cram ought to provide all that they require in the way of preparation, their knowledge of theoretical and experimental optics being in many cases of no longer date. Of course, amongst such candidates, there is much disappointment, and happily there are good candidates as well as bad. But the good candidates are often self-taught or privately taught, and owe little or nothing to any public educational institution: the science schools and the municipal technical schools have not been of the slightest help to them. It is for the leaders in the optical industries to inquire why the great expenditure of money on technical education does little or nothing to benefit them, or why the younger men in the industry do not avail themselves of that which exists. The optical industries of Germany have profited enormously by the scientific training in endowed laboratories of physics of the men who are now the heads of departments and managers of their optical factories. Think only of the advanced state of certain branches of optics in Germany, revealed by that most remarkable catalogue of the collective exhibit at the Paris Exhibition of the opticians and instrument makers of Germany. Not that we are to take German methods and copy them. England has to work out its own problem in its own way; but at present, save for the classes at the Northampton Institute, its educational systems are not being used to help the opticians.

This brings me back to the vital suggestion of my paper, the creation—whether at the Northampton Institute, in Clerkenwell, or elsewhere—of a real *Optotechnical Institute*. It will need buildings, equipments, a staff, and an adequate income for maintenance. I think its curriculum ought to be somewhat as follows:—

(a) *Entrance Examinations*.—Computation (including logarithms, slide-rule, and use of trigonometric tables), geometrical drawing, German.

(b) *First Year*.—Physics, mechanics, algebra and trigonometry, projective geometry, drawing, laboratory work in simple optics, with lens grinding and prism grinding.—*Certificate of Preliminary Studies*.

(c) *Second Year*.—Calculus, higher optics (including aberrations), mechanical drawing of optical instruments, machine design as applied to instruments, laboratory measurements.—*Certificate of Further Studies*.

(d) *Advanced Course*.—Applications of calculus, higher geometry, theoretical optics, computation of lenses, optical design, higher optical measurements, and optical research.—*Honours Certificate*.

The staff ought to be picked men, who have liberty to practise as consulting opticians, that is to say, as consulting optical engineers. The aim ought to be to attract a few really good students rather than a crowd of mediocre ones. Every facility ought to be given for a student who can only afford a year's course as a day-student to continue his training in the evening, the laboratories being opened certain evenings during the week. The institute ought to make a speciality of having a perfect optical library, with collections of models and of detailed drawings. Finally, the members of the staff ought to be encouraged to write optical monographs on some consistent plan, to replace the academic text-books of the past. It ought also to bring out a respectable optical journal, with technical papers in optics well illustrated, not interlarded with trade advertisements, feeble jokes, or silly personal recriminations.

Not one of our poor optical journals can be named in the same breath

as the *Zeitschrift für Instrumentenkunde*. In the English language we have no technical books to set beside the "Handbuch der Angewandten Optik," of Steinheil and Voit, or the "Theorie der Optischen Instrumente" of Czapski.

Scientific books, elementary and advanced, written by opticians for opticians, are, for the moment, the thing most urgently needed for the furtherance of optotechnics.

THE PERSULPHATES AND THEIR USE AS PHOTOGRAPHIC REAGENTS.

(A paper read before the Edinburgh Photographic Society by HUGH MARSHALL, D.Sc.)

When I undertook to contribute a short paper to the society, it was understood that the subject should be really a chemical one, but connected with photography; for, although at one time I did a considerable amount of photographic work, it is now many years since I produced a negative. In fixing on the persulphates and some of their reactions as the subject of my paper, I did so because these salts are now of considerable importance to photographers, and, having been the first to prepare them and study their reactions, I am, naturally, specially interested in any of their applications. You must understand, however, that I have never myself used the persulphates for any photographic purpose whatever, though I have investigated somewhat fully most of the reactions on which their use depends; and it is therefore as a chemist, and not as a photographer, that I address you to-night. The persulphates were first prepared fully eleven years ago, the potassium salt having been shortly described by me in a note communicated by me to the Royal Society of Edinburgh, on 16th February, 1891. The method then employed still remains the only mode of preparation, and consisted in the electrolysis of a concentrated solution of an acid sulphate.

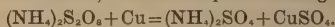
When an electric current is passed through an aqueous solution of a salt, the salt invariably undergoes decomposition into the metallic part, on the one hand, and that which is not metal, on the other. The former is liberated at the terminal connected with the negative pole of the battery (the cathode), while the latter is liberated at the other terminal (the anode). In a great many cases secondary changes take place as soon as the constituents of the salt are liberated, depending on the nature of the constituents and also on other conditions. In the case of potassium salts, sodium salts, and ammonium salts, as well as others, the liberated metal (or metal-like group NH_4 .) cannot exist in presence of water, but decomposes the latter with formation of free hydrogen, so that in such cases the latter gas is evolved at the cathode. The product liberated at the anode may undergo various changes, according to circumstances. It may act upon the material forming the anode; if the anode is unattackable, it may act upon the water, or upon substances dissolved in the water, or the individual particles of the primary product may unite among themselves to form more complex particles of a secondary product. It is the last kind of action which gives rise to the formation of persulphates by electrolysis. When a dilute solution of an acid sulphate, say the potassium salt $KHSO_4$, is electrolysed, a great proportion of the hydrogen of it plays the part

of a metal and travels with the potassium to the cathode, while SO_2 goes to the anode, and, on being liberated there, acts upon the water to form sulphuric acid and free oxygen, which is evolved. In a concentrated solution, however, much of the hydrogen remains united to the SO_2 , and the group HSO_4 is liberated at the anode. Many of these HSO_4 particles when liberated, act upon the water to form sulphuric acid and free oxygen, but many others unite together in pairs to form the more complex group $\text{H}_2\text{S}_2\text{O}_8$, which is persulphuric acid. The proportion of the liberated groups uniting in this way is greater the more closely the HSO_4 particles are packed together at the moment of liberation, and therefore it is advisable to keep the surface of the anode very small if a good yield of persulphate is desired. It is also necessary to keep the temperature low. In course of time, as the proportion of persulphuric acid in the liquid round the anode increases, potassium persulphate is formed from the persulphuric acid and the potassium bisulphate present, and being sparingly soluble, soon begins to crystallise out. On a small scale the preparation of potassium persulphate can be easily and simply shown in the following manner. A wide Y-tube, sealed at the bottom, but open above in both limbs, is filled with a saturated solution of potassium bisulphate. The cathode, consisting of a cylinder of platinum foil or sheet lead, is immersed in the liquid in one limb, while the anode, consisting of a thin platinum wire, is immersed in the liquid in the other. The tube and its contents are kept cool by being placed in a vessel of cold water. On passing a current from a battery of two accumulators through the solution for some time, a considerable quantity of persulphuric acid is produced, and in about a quarter or half an hour potassium persulphate begins to crystallise out and collect at the bottom of the tube. On the large scale, a "divided cell" is used for the electrolysis, that is to say, the liquid surrounding the anode is separated from that surrounding the cathode by means of a porous septum, so as to hinder as far as possible the transference of persulphate to the cathode, where it would be decomposed with re-formation of acid sulphate. Various other particulars have to be attended to, into which it is unnecessary to enter here.

Ammonium persulphate is easily prepared in the same way from ammonium bisulphate, and the sodium salt can also be obtained from sodium bisulphate, but with greater difficulty, as it is much more soluble in the acid liquid. These three are the only ones which have been obtained directly, others have been prepared indirectly from ammonium persulphate.

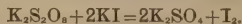
The crude products obtained by electrolysis are impure, and require to be purified by draining off the adhering acid liquor, washing with cold water, and, if the purest obtainable product is required, dissolved in warm water and recrystallising. Potassium persulphate is very sparingly soluble in cold water (about 1.7 per cent. at 0°C .); being much more soluble in warm water, it can be easily purified by recrystallisation. Ammonium persulphate, on the other hand, is very soluble in cold water (about 55 per cent. at 0°C .); it is, therefore, not nearly so easily purified as the potassium salt. The difficulties are still greater in the case of sodium persulphate. The dry purified salts can be kept for a long time without undergoing appreciable decomposition. I still possess part of the original preparation of potassium persulphate, and some samples which were prepared ten years ago and preserved for use in bottles in the ordinary way have undergone hardly any chemical change in that time. Moist or impure specimens, however, decompose gradually with the formation of acid sulphate and liberation

of oxygen (partly as ozone), and ammonium persulphate is not so easily preserved as the potassium salt. By the decomposition of ammonium persulphate, oxidised compounds of nitrogen may be produced. Solutions of persulphates gradually decompose, especially on warming, like the moist solids. The pure, dry salts are immediately decomposed when strongly heated. Seeing that persulphates evolve oxygen in presence of water, it is evident they will act as oxidising agents. These oxidising actions are best seen in concentrated solutions, especially in presence of acids. In fact, a mixture of persulphate with sulphuric acid constitutes what is probably the most powerful oxidising agent known. On account of this oxidising action, persulphates may be, and in certain cases, actually are, employed for bleaching and disinfecting purposes, and also medicinally. In moderately dilute aqueous solution, however, perhaps the most striking character of the persulphates is not so much a direct oxidising action, as their tendency to take up metals and form sulphates. From this point of view potassium persulphate, $K_2S_2O_8$, to take a definite example, might be looked upon as potassium sulphate, K_2SO_4 , united to an extra SO_4 , this extra SO_4 being easily given up to form sulphate by union with a metal. Consequently, a solution of potassium persulphate (or any other persulphate) not only attacks and dissolves most metals which form sulphates more or less soluble in water, but also decomposes many metallic compounds, abstracting the metal, and thereby giving rise to many interesting reactions. The action on metals themselves is best seen in the case of copper, owing to the colour of its salt solutions. If strips of the bright metal are placed in a test tube and covered with a solution of persulphate, the solution soon becomes blue, showing that the metal is rapidly attacked; if a fairly concentrated solution of persulphate has been employed, the liquid becomes quite warm, indicating that the action evolves a good deal of heat. In such actions there is no evolution of gas, as is the case when metals dissolve in acids, the two sulphates being the only product—



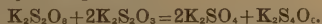
A similar action takes place with other metals, including silver; there are certain peculiarities in the case of silver, which will be referred to subsequently. The actions with metals like copper and silver, which do not dissolve in the common dilute acids, except nitric acid, are of considerable interest, as they permit of the use of persulphate solutions for the purpose of etching these metals, in place of the somewhat objectionable nitric acid generally used. The great ease with which some metals are attacked is well illustrated by shaking up some fine, clean, iron filings with a fairly concentrated solution of ammonium persulphate; the metal is rapidly dissolved, and there is great evolution of heat.

The action of persulphates in removing metals from their compounds is illustrated by their behaviour towards a solution of an iodide; iodine is gradually liberated and sulphate formed—

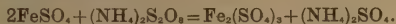


Similar actions take place with chlorides and bromides, and there are others of considerable interest. I shall only refer further to one which is of special interest photographically—that with a solution of a thiosulphate ("hypo"). In this case a tetrathionate is produced, the same as when iodine acts upon a thiosulphate; in fact, this reaction can be employed as a method of preparing tetrathionates. Persulphate is a more powerful oxidising agent than chlorine water. Chlorine oxidises thiosulphate to sulphate, and it might have been expected that persul-

phate would also do so. This is not the case, however, the direct action being represented by the equation—



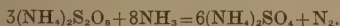
Some metallic salts are converted into higher salts of the same metal by means of persulphates. This solution of ferrous sulphate is quickly changed into ferric sulphate—



In other cases peroxides are formed; this is well shown by warming a solution of a manganous salt with persulphate. A similar reaction takes place with silver salts, and in this case the changes are of exceptional interest. With potassium persulphate, a black precipitate of silver peroxide is gradually formed on the addition of solution of silver nitrate or sulphate; in course of time, this precipitate decomposes and dissolves, oxygen being evolved. With ammonium persulphate, however, the action is different; very little, if any, silver peroxide is precipitated, but the solution decomposes far faster than one to which silver salt has not been added. Under these conditions also the decomposition products are not merely those formed from a pure solution, as a considerable quantity of nitric acid is produced by the oxidation of part of the ammonium nitrogen, thus—



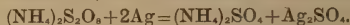
Although the oxidation is due ultimately to the persulphate itself, from experiments I have made there can be little doubt that the particular course which the decomposition takes is brought about by the intermediate formation of silver peroxide, which then acts rapidly on the ammonium. A small quantity of silver can thus cause the decomposition of a large quantity of ammonium persulphate in a relatively short time. The greater the quantity of silver in a given quantity of solution, the more rapid is the change, and the rate is also greatly increased by rise of temperature. The great influence which small quantities of silver have on the decomposition of persulphates is best shown in ammoniacal solutions. In this case the products are again different, ammonia being oxidised to free nitrogen in accordance with the equation—



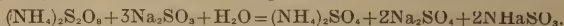
The action can be strikingly exhibited by preparing a cold saturated solution of ammonia persulphate in strong ammonia, and then adding to it a small quantity of silver nitrate solution. Until the silver is added no action is observable in the solution, even on standing a considerable time, but as soon as the silver is added effervescence sets in and steadily increases; at the same time the solution becomes warm, so that ammonia begins to boil off, and the action becomes quite violent. It is evident, therefore, that a soluble silver compound present in a solution of persulphate, though it may not make the persulphate a more powerful oxidising agent, nevertheless acts powerfully as a "catalytic agent" in accelerating the action of the persulphate, and making the change proceed in a manner different from that observed in the absence of silver.

We may now consider, shortly, the special applications of persulphates in photography. The first of these to be proposed was the use of potassium persulphate as a "hypo-eliminator," under the name of *anthion*. As I pointed out a considerable time ago, however ("Jour. Soc. Chem. Ind.," xvi, 399, 1897), such a use is based on an entire misconception of the action of persulphates on thiosulphates, and is open to two serious objections directly contradictory of the advantages claimed: firstly, the

tetrathionate which results from the action is just as objectionable as the original thiosulphate, as it easily decomposes, giving free sulphur and other deleterious products; secondly, the persulphate is certain to attack the silver image itself. The latter of these objections, however, leads to the second proposed use of persulphates in photography, one which has proved much more practical and satisfactory than the other, namely, the use of ammonium persulphate as a density-reducer for negatives. The action of ammonium persulphate as a density-reducer is simply that of a silver solvent already referred to, silver sulphate being formed—



Shortly after its introduction for this purpose, however, it was stated that ammonium persulphate differed from the substances employed for the same purpose, in that it acted to a greater proportionate extent on the densest part of the negative, and was therefore superior to other density-reducers in most cases where employment is desirable. A preferential action of this kind is just the opposite of what we should expect, and was at first inexplicable, and I understand that some observers have contradicted the statement. In view of what I have already shown, however, as to the effect of silver salts on persulphate solutions, it is now possible to give a reasonable explanation of such an effect. With a silver solvent unaffected in its action by silver salts in solution, we should expect the less dense parts of the negative to be most attacked (proportionately, of course), for the following reasons: Unless the action is a very slow and prolonged one, the quantity of solvent first taken up by the film will be replaced only to a slight extent as it becomes used up, owing to the somewhat slow exchange of material between the unabsorbed solution and that in gelatine. We may assume that at first the quantity of silver dissolved at any part is roughly proportional to the density of the image at that part, consequently wherever the density is greatest the solvent will be most weakened by the using up of its active ingredient there. The action will therefore become slower at these places, while continuing at an almost undiminished rate at points where the density is very slight; therefore, with such density-reducers, we should expect the dense parts to be proportionately less reduced than the others. In the case of ammonium persulphate, the same reasoning applies up to a certain point, for the greater dissolution of silver in the denser parts will cause a greater diminution of the amount of available persulphate there. But, on the other hand, the solution at these places has been rendered more active by the presence of a larger proportion of silver sulphate in it, and this increase in rate of action may be sufficient to balance or reverse the weakening effect due to greater destruction of persulphate. That the quantity of solution originally absorbed by the film is sufficient to bring about most or all of the action, without being replenished from that in the dish, is shown by the extent to which the action proceeds when the plate is bodily removed from the dish, which makes it necessary to destroy the persulphate in the film as soon as possible after the reduction has proceeded to a sufficient extent. This is effected by means of solution of sulphite, which is oxidised to sulphate—



If the above explanation is correct, a strong solution of persulphate, freshly prepared, should work best where reduction in contrast is required. Where a more uniform and proportionate reduction of density is required, a more dilute solution already containing a small quantity of silver salt would probably be preferable, as in such a case the local increase in the proportion of silver salt at the denser part of the image would have

less effect relatively than would have been the case had the solution been quite free from silver originally. It is evident from what has been stated that solutions once used will not keep for any length of time, and their action may differ distinctly from freshly prepared ones, owing to the presence of the small quantity of silver sulphate which they contain.

ON THE RADIO-ACTIVITY OF MATTER.

(A Discourse delivered before the Members of the Royal Institution by
MONS. HENRI BECQUEREL.)

The property possessed by certain bodies of emitting invisible and penetrating rays was unknown six years ago. The speculations brought about by the experiments of M. Röntgen led to the examination of material bodies, to see if any of them had the power of emitting similar radiations; the phenomenon of phosphorescence naturally was first thought of, being a known method for the transformation and emission of energy. This idea, however, could not be applied to the phenomena with which we are occupied, but it was very fruitful. It led to the choice, among phosphorescent bodies, of the salts of uranium of which the optical constitution is remarkable on account of the harmonic series of the bands of their absorption and phosphorescent spectra. It was while experimenting with these bodies in 1896 that I first observed the new phenomena which I am about to bring before you this evening. I have here the plates of the double sulphate of uranium and potassium, obtained by Lipmann's method, which I used for my first experiments. After having placed one of these plates on the black paper which covered a photographic plate, and leaving it for several hours, I observed, on developing the plate, that the uranium salt had emitted certain active rays, traversing the black paper, as well as various screens interposed between the plate and the active body, such as thin sheets of glass, aluminium, copper, etc. I soon saw that this phenomenon had nothing to do with phosphorescence, or with any known method of excitation, such as luminous or electric rays, or any appreciable variation of temperature. I had to deal, therefore, with a spontaneous phenomenon of a new order. The absence of any known exciting cause on a body prepared in the laboratory several years ago, caused me to think that the phenomenon would have been the same at any time it might have been observed; it should therefore be permanent, that is to say, there should not be any appreciable weakening after a very long time. This is, in fact, what I have proved during the past six years. I will show you the first proof I had of the spontaneity of the rays; these rays have traversed the black paper which covered the photographic plate, and a thin strip of copper in the form of a cross. Here again is the radiograph, made about the same time, of an aluminium medal; the unequal absorption of the different thicknesses has caused the appearance of the effigy thereon. After the very first observation I observed that the new radiations would discharge electrified bodies, at some distance in the air, a phenomenon which gives us a second method of studying these rays; the photographic method is specially qualitative, while the electrometer furnishes numerical elements of comparison.

In the course of these first observations I was led away from the path towards which later experiments brought me back by several facts, of which the following is the principal: Having protected a photographic plate by means of a sheet of aluminium 2 mm. in thickness, and having arranged on the aluminium several samples of phosphorescent powders,

placed on separate plates of glass, and covered with small tubes like clock shades, the photographic proofs, obtained after forty-eight hours, showed silhouettes of the plates of glass just as if they had been produced by the total refraction and reflection of rays identical with those of light, but which must have traversed the 2 mm. of aluminium. This photograph is unique; I have never been able to reproduce it or obtain any action with the same example of sulphide of calcium, nor with any other phosphorescent preparation. At about the same time M. Niewenglowski obtained an impression with sulphide of calcium, and M. Troost with hexagonal blende. To this day I do not know the cause of the activity of these products or its disappearance. These facts, and some others, gave me the idea that the new rays might be a transversal movement of the ether analogous to that of light; but the absence of refraction and a large number of other experiments made me abandon this hypothesis. In this same year, 1896, I found that all the uranium salts emitted rays of a similar nature, that the radiant property is an atomic one belonging to the element uranium, and electric measurements showed me that metallic uranium was about three and a half times more active in ionising air than is the double sulphate of uranium and potassium. The same method enables us to study the rôle played by the gases in the discharge, and to observe that a sphere of electrified uranium retains its charge *in vacuo*, while in air it loses it. The rate of the fall of potential is sensibly proportional to the potential if the latter is only a few volts; it should be constant and independent of the potential when this is very high. Gas rendered conducting by these rays retains this property for some instants. Between two conductors maintained at constant potentials these rays set up in air a continuous current. These experiments were taken up and elaborated by Lord Kelvin in 1897, then by Messrs. Beattie and S. de Smolan. In 1899 Mr. Rutherford showed how the phenomena due to the conductivity communicated to gases by uranium, and the existence of a maximum in the current produced, could be explained by the hypothesis of ionisation, to which the beautiful work of Mr. J. J. Thomson has given the seal of authority.

In 1898 M. Schmidt and M^{me}. Curie observed, quite independently, that thorium has properties analogous to those of uranium, properties which were specially examined by Mr. Owens and Mr. Rutherford. M^{me}. Curie, having measured the ionising activity of a large number of minerals containing uranium or thorium, announced the remarkable fact that several minerals were more active than metallic uranium. M. and M^{me}. Curie concluded that there must be a more active body than uranium in the mineral, and they undertook the task of isolating it. By treating one of the most active of these minerals, viz., pitchblende from Joachimstal, they first separated an active bismuth, to which they gave the name of polonium; then shortly afterwards they obtained a very active barium containing a new element—radium. These bodies are prepared by fractional precipitations, in which one is guided by the indications of the electrometer; the activity of these products is 100,000 times greater than that of uranium. About the same time M. Geissel succeeded in preparing some very active substances, and in 1900 M. Debierne announced the existence of a new element, actinium, about which, however, we have not heard many particulars. Of all these new bodies radium alone is characterised as a new element; it has an emission spectrum consisting of lines which do not belong to any other known body, and the atomic weight of the active salts of barium was found to increase with the proportion of radium present. The activity of uranium was not sufficient to excite phosphorescence in other bodies;

M. and Mdme. Curie, however, observed this phenomenon with the rays from radium, and, further, that the salts of radium were themselves luminous, their luminosity being, like their radio-activity, spontaneous. The activity of radium produces various chemical reactions; it colours glass, it transforms oxygen into ozone, it changes white phosphorus to red, it ionises not only gases but also liquids, such as petroleum and liquid air, and insulating solid bodies, such as paraffin, developing in this latter body a residual conductivity which lasts a long time after the rays have ceased to act. It also causes on organic tissues serious burns analogous to those produced by X-rays. The sample of radium that M. and Mdme. Curie have lent me for the purpose of this lecture enables me to show you a few of these phenomena—ionisation of the air, luminosity, and phosphorescence.

I have observed by means of the photograph I now show that the radio-activity of polonium will not traverse a thin sheet of black paper forming a small cylinder closed by aluminium or mica, and at the bottom of which was placed the powdered material; the rays from radium easily pass through this envelope; we shall see that still more profound differences exist between these two kinds of rays. The radio-activity of radium restores to certain crystals, and to glass, the property of becoming phosphorescent by heat which they have lost owing to a previous elevation of temperature. The phenomena of absorption, examined either by means of photography, by phosphorescence, or by ionisation of the air, showed the heterogeneity of the class of radiations emitted; subsequent observations have enlarged the field of this research. Towards the end of the year 1899 M. Giesel, and then MM. Meyer and Schweidler, observed that the rays of radio-active preparations were deviated by a magnetic field in the same manner as are the cathodic rays. For my part, at about the same time, without having heard of these experiments, I observed the same phenomenon with radium. The experiment can be made in the following manner: A small paper cylinder containing a few grains of the radio-active body is placed horizontally on a photographic plate covered with black paper, between the poles of a magnet; the rays are thrown entirely to one side of the plate. I here show my two first photographs, one of which shows a concentration on one pole of the magnet. Very shortly afterwards, I observed that the rays from the polonium are not deviated, and, consequently, that two kinds of rays exist—one deviable, and the other non-deviable. M. and Mdme. Curie have made an electric examination of this subject, which has proved the simultaneous existence of these two kinds of rays in the radio-activity of radium, their unequal permeability varying with the distance from the absorbing screens. The accompanying photograph shows these two kinds of rays from radium. I have recently observed that uranium emits only deviable rays; that is, saving the existence of much less active, non-deviable rays. In fact, there does exist a third kind of ray which are not deviable, but are extremely penetrating; they have been shown more particularly by M. Villard. Thus, the activity of radio-active bodies comprises three kinds of rays—rays which are deviable in a magnetic field, which appear to be identical with cathodic rays, and two sorts of non-deviable rays, one kind being very easily absorbed, the other resembling X-rays, and being very penetrating. Uranium emits principally the first kind; polonium gives only the second; and radium gives all three at once.

Let us now return to deviable rays. The material theory of Sir William Crookes and Mr. J. J. Thomson can be applied to them, and the consequences can be verified with the greatest facility. In a uniform

magnetic field the trajectories perpendicular to the field are circumferential to the path p , which leads the rays to the point of emission. For an oblique emission making an angle with the field, the trajectories are helices enveloping the cylinders with rays $p \sin \alpha$. By placing on a horizontal photographic plate parallel to the uniform field, a small lead box containing a few grains of radiferous barium forming a source of very small diameter, the rays are drawn down to the plate, and excite it on one side alone; a bundle of simple rays emitted in the plane normal to the plate and parallel to the field should show theoretically an arc of an ellipse of which the axes are in the proportion of 2 and μ . The accompanying photograph shows these theoretical arcs, obtained by reversing the direction of the field, the one in air and the other *in vacuo*, on a photographic plate enveloped in black paper; the intensity of the magnetic field was about 4,000 C.G.S. units. If we do not enclose the photographic plate, and if we arrange on it several strips of paper or of metal to form screens, we observe in the print of the radio-activity dispersed by the magnetic field, a species of absorption spectra. Each trajectory has a different curvature corresponding to rays of different speeds, and having different penetrating powers. Here is an example of one of these prints, obtained in a field of about 1,740 C.G.S. units; the screens are a strip of black paper, a strip of aluminium of 0.1 mm. thickness, and a strip of platinum of 0.03 mm. thickness. To obtain a pure spectrum so that at each point of the plate a bundle of rays are found, of which the trajectories have all the same curvature, the rays should be made to issue from the source so as to pass through a small round opening; the result is the same as the preceding one. This latter also shows a very intense impression, due to the secondary rays, provided by the rays which were stopped by the lead cover over the active body, and in which was made a small opening through which the pure spectrum passed. The absorption varies with the distance of the screen from the active body, and the rays which are stopped by a screen placed on the plate are able to traverse this same screen when it is interposed at a point near their source. These experiments leave little doubt as to the identity of the deviable rays with cathodic rays. However, it was necessary to prove that they carry charges of negative electricity, and that they are deviated by an electric field. M. and Mme. Curie, in a beautiful experiment, have shown that the rays of radium charge negatively the bodies that receive them, and that the source becomes charged positively. For this double experiment it is necessary that all the conductors and the source itself be completely enveloped in an insulating material, such as paraffin. For the active body examined the charge was $4 \cdot 10^{-13}$ C.G.S. units per square centimetre of radiating surface per second.

For my part, I have shown and measured the electrostatic deviation by projecting the deviated shadow of a screen placed perpendicular to the field on a photographic plate. One of these apparatus is here shown, as well as one of the prints obtained in which on the two halves of the same plate appear the two deviated shadows corresponding to the reversal of the electric field, of which the intensity was $1 \cdot 02 \cdot 10^{12}$. The ballistic hypothesis attributes these phenomena to material masses transporting charges of negative electricity with very great rapidity. Let m be the material mass of a particle, e its charge, and v its velocity. We know that in a magnetic field of an intensity H , the radius of

curvature p of the circular trajectory is given by the equation $H\rho = \frac{mv}{e}$.

The numerical value of the product H_p serves to show the character of each simple ray. On the other hand, in an electric field of an intensity

F , the parameter of the parabolic trajectory is $\frac{mv^2}{eF}$. The knowledge of

these two values gives $\frac{m}{e}$ and v . With a value of $H_p = 1600$ I obtained

approximately $v = 1.6 \cdot 10^{10}$, and $\frac{e}{m} = 10^7$. These figures are entirely of

the same order in value as those which led to the measurements made with cathodic rays, and the theoretical considerations with regard to Zeeman's experiment. From the above figures we deduce that, from the fact of the deviable radio-activity under consideration, there escapes from each square centimetre of radio-active surface 1.2m.grms. of matter in a thousand million years. By extending these measurements to radiations of different and well-known natures we ought to be able to

determine if the relation $\frac{e}{m}$ is constant, or variable with one ray or

another, and whether these do not differ only in their speeds; I have not yet finished the experiments I undertook to decide this fundamental question, but recently M. Kaufmann has attempted to elucidate the matter. He combined, at right angles, the magnetic and electric actions; unfortunately, the experiment, which is very difficult to perform, did not give him one plate fit to measure. For the values of H_p com-

prised between 1,800 and 4,600, he found that the relation $\frac{e}{m}$ varied from $1.3 \cdot 10^7$ to $0.6 \cdot 10^7$, and the speed v from $2.3 \cdot 10^{10}$ to $2.8 \cdot 10^{10}$. The

proof of a regular variation in the calculated relation $\frac{e}{m}$ is of considerable

theoretical importance; if this relation was constant, as it seemed to be as the result of a large number of measurements, we might conclude that the slightly deviable rays, for which H_p is more than 5,000, have speeds considerably greater than that of light.

On the other hand, theoretical considerations have given the idea that the speed could not surpass that of the propagation of electromagnetic disturbances; that is to say, the speed of light; and we have been led to consider the mobile masses in a magnetic field as endowed with a particular inertia which is a function of the speed. Under these conditions the calculated mass ought to be apparent, or at least partly so, and it should increase indefinitely as the actual speed approaches that of light. The figures published by M. Kaufmann bear out this hypothesis. Another consequence of this manner of looking at the question would be that there should be continuity between the deviable rays and those which are not, as the radius of curvature of the trajectories becomes infinite at the same time as the apparent mass. The photographic print already mentioned, as well as one of the following ones, showed, on the contrary, a very distinct discontinuity, although in the second one the exposure was sufficiently prolonged for the impression the least active rays, such as the penetrating non-deviable ones, to be distinctly visible. This proof was obtained in the following manner: In the uniform magnetic field of a permanent magnet, I placed, normally to the field, a photographic plate, then on this latter I arranged

screens of lead fixed on a sheet of glass. These screens are pierced with openings normal to the plate, and destined to limit the width of the beam; in the path of these beams I arranged other screens, such as aluminium ones. Below the plate, opposite a narrow slit in a strip of lead, a small block of lead is placed, having a deep cavity normal to the plate, and in which the radiant body is placed. We have thus a narrow, linear source normal to the plate and several millimetres in length. The cavity is covered with a thin sheet of aluminium to stop the light rays. The figure represents a section made normally to the field of the beam, of which a part is deviated. Each beam corresponding to a determined speed gives an impression which is noticeably curved, as if the entire trajectory was marked on the plate. In these photographs the interior of the cylinders forming the screens is strongly affected by the secondary emission from the lead. The first picture shows that through each opening there passes an infinity of rays, constituting portions of the pure spectra. These meet with a strip of aluminium of 0.1 mm. in thickness, and traverse it without deviation, but not all with equal facility. The slightly deviated rays are penetrating, and excite secondary radiations when leaving the aluminium. The very deviable rays are stopped and give rise to points affected by an intense secondary radiation. One only of the two categories of non-deviable rays appears in the form of two fine lines opposite the source; these are very penetrating rays; the others were arrested quite near the source. Another picture shows the simple beam obtained by a double series of openings; by one of them we can sometimes pass two distinct trajectories. The third figure is of interest, as it shows the straight beam traversing, without deviation, a sheet of aluminium placed obliquely to the line of trajectory; and, finally, the fourth one shows the transmission of simple rays through aluminium, and the secondary effects they produce. The same method has enabled me to observe that the secondary rays were themselves deviated by the magnetic field, in the same way as the exciting rays. The radiations from radium also comprise some which are very penetrating, consisting of the least deviable and the non-deviable rays, of which the properties seem to be the same as the Röntgen rays. These penetrating rays are but very slightly absorbed, and, consequently, their action on a photographic plate or on the air is very feeble, so that by the preceding methods we can get no very exact idea of their intensity. If we interpose in their path a very absorbent screen, they traverse it partially, but at the same time they become partially transformed into more absorbable rays. This transformation recalls that of fluorescence, and, through the secondary action, the effect immediately behind the screen is stronger than if this latter was not there. The photographic plate receiving the radiations—filtered through a thickness of lead of 1 cm.—gives a stronger impression through a sheet of lead of 1 mm. thickness than in the uncovered regions. The diagram shows the effect of the radiations coming from the sides of a leaden box after having traversed 5 to 12 mm. of the metal. These secondary phenomena may partially account for the appearance of shadows given by the edges of all the transparent screens placed over the photographic plates.

All the facts I have just related have exclusively to do with the obscure radiations which traverse opaque bodies, such as metal, glass, mica, etc. But there exists also another, quite different, phenomenon, of which the effects are arrested by glass and mica; they are comparable to those produced by a vapour of a special nature. This phenomenon was discovered in 1899 by Mr. Rutherford and by M. and Mme. Curie simultaneously. Mr. Rutherford, while examining the radiations from thorium, observed that, besides the ordinary rays, there was another effect pro-

duced by an "emanation" consisting of a sort of vapour ionising the air. This vapour is deposited on bodies, principally those electrified negatively, and makes them momentarily radio-active. Mr. Rutherford made some very interesting measurements of this phenomenon. At the same time, M. and Mme. Curie discovered that, under the influence of radium, bodies became temporarily radio-active. This is not the secondary effect already described, but a persistent phenomenon which disappears comparatively slowly from the moment when the action of the radium ceases. M. Curie has called this "induced radio-activity," and has made a very complete examination of it. He has observed that the phenomenon is produced with great intensity in a closed space, that induced activity is the same on all bodies and practically independent of the pressure inside the enclosed space, but that the phenomenon is not produced if we maintain a complete vacuum by removing the gases produced; solutions of salts of radium produce the same effect with greater intensity than the solid salts. Liquids, water of crystallisation extracted from active salts, or the water separated from an active solution by a semi-permeable membrane of celluloid, remain strongly radio-active; it is the same with the gases. These excited bodies produce the same effects as radium; they emit a penetrating ray which traverses the glass vessels which contain them and makes these latter luminous. Induced activity is gradually propagated in gases in a sealed tube, even through capillary tubes and imperceptible cracks; bodies are excited the more as the volume of gas is greater in proportion to their surface. Phosphorescent bodies become luminous when excited. In a recent work M.M. Elster and Geitel have observed that atmospheric air has properties analogous to those of excited gases, and they have been able to collect on wires negatively electrified traces of radio-active products. The cause of this radio-activity is a problem of the greatest interest.

Finally, there is a remarkable method of induction, which is of such a nature as to demand the greatest reserve in the conclusions which might be formulated relative to the presence of new elements in radio-active bodies. Every inactive substance which has been added to a solution of a uranium or radium salt, and which has subsequently been removed by precipitation, has become radio-active, and loses this radio-activity very slowly. This fact was first observed by M. Curie and M. Giesel, who rendered bismuth radio-active in this manner. In the case of uranium, a trace of barium, precipitated in the form of sulphate, became notably more active than the uranium; barium thus excited emits only deviable rays like uranium. After this precipitation, the uranium salt, brought back to the solid state, is less radio-active than before; this loss of radio-activity can even be accentuated by successive operations, but the products gradually and spontaneously regain their original activity. The temporary diminution of activity after solution is a general fact for salts of uranium and radium. With salts of actinium M. Debierne has communicated a very great activity to barium. The barium thus excited can be separated from inactive barium; it can be fractionated like radiferous chloride of barium, the most active portions being the least soluble in water and hydrochloric acid. M. Debierne in this manner obtained a product a thousand times more active than uranium. Barium thus excited behaves as a false radium, but it differs from true radium in the absence of the spectrum and in gradually losing its power with time. Among the radio-active preparations a large number may be temporarily excited bodies. Such is the case with "polonium," which is apparently only excited bismuth. Uranium and radium are characterised by their emission spectra and by the stability of their radio-activity. The spontaneous activity observed in the case of

different salts after solution might find an explanation in a phenomenon of auto-induction of the active molecules on the inactive one they are associated with. The origin of the radiant energy of these radio-active bodies is still an enigma. By the material hypothesis it does not appear unreasonable, by applying the phenomenon of the evaporation of an odoriferous body, to compare the emanation to a sort of gas, of which the molecules would have masses of the same order of size as electrolytic ions, and to identify the radiations with the cathodic rays resulting from the dislocation of these ions, and causing at the same time the emission of X-rays. We might thus ascribe the expenditure of energy to the dissipation of active matter. Although this hypothesis will account for most of the known facts, still there does not exist any precise experiment which sanctions it. I must not, however, dwell longer on this subject, of which I have incompletely summarised the present position, by emphasising the physical part, which comes more especially within my province, although the chemical side has given rise to work of the greatest interest. These questions have raised new hopes on the transformation of matter. Besides the exceptional conditions under which they enable us to examine the cathodic rays, they have raised, and continue to raise, fresh problems every day, of which the first and most mysterious is the spontaneity of the radiations.

THE TELEPHOTO LENS AND ITS MEASUREMENTS.

(A Paper read before the Société Française de Photographie by MAX LOEHR.)

The problem we propose to solve is the length of a telephoto lens and the position of the enlarged image, varying with the degree of magnification, or, in other words, the different extensions of the telephoto lens itself and the camera upon which it is fixed.

Let us take the following factors:—

- f_1 , focus of the positive lens.
- f_2 , focus of the negative lens (or eye-piece of telescope).
- f , focus of the telephoto combination.
- a distance of object for the negative lens, or measure of its introduction within the cone of rays parallel to the optical axis.
- a' , distance of image from the negative lens.
- V , enlargement.
- e , separation between the nodal planes of the positive and negative lenses.
- Δ , the optical interval, or the distance between the focal points of the positive and the negative lenses: the $a + f' - f^2$ of Dallmeyer (B. J. P., 1893, p. 477). See also Dr. A. Steinheil: Ueber Fernphotographie. Phot. Corr., 1892, p. 483. (B. J. P., 1901, p. 407.)

The following relations are at our service:—

I. The evident ratio of $\frac{a}{a} = V$, and likewise of $\frac{f}{f} = V$.

II. The well-known fundamental formula:—

$$\frac{1}{a} - \frac{1}{f} = \frac{1}{f_2}$$

Starting from this point, by introducing the values of the first equation to the second, we get the following new values:—

$$\begin{aligned}\text{I.} \quad a &= \left(\frac{V-1}{V} \right) f_2; \\ \text{II.} \quad a &= \left(\frac{V-1}{V} \right) f_2; \\ \text{III.} \quad a - a &= \left(\frac{V-1}{V} \right)^2; \\ \text{V.} \quad \Delta &= f_2 - a = \frac{f_2}{V};\end{aligned}$$

or, since $V = \frac{f}{f_1}$,

$$\Delta = \frac{f_1 f_2}{f};$$

or, again, in another manner, by substituting the optical interval $|\Delta|$ for the factors I. and III.—

$$\begin{aligned}\text{I.} \quad a &= (V-1) \Delta \\ \text{II.} \quad a &= V(V-1) \Delta \\ \text{III.} \quad a - a &= a(V-1) = (V-1)^2 \Delta\end{aligned}$$

To demonstrate this, let $f_1=126$ mm., $f_2=45$ mm., and $V=3$ times, we find that:—

$$\begin{aligned}\Delta &= 15 \text{ mm.} \\ a &= 30 \text{ mm.} \\ a &= 90 \text{ mm.} \\ a - a &= 60 \text{ mm.}\end{aligned}$$

The proportions of this example are observed in the diagram.

Greater magnification, that is to say, a larger V , is obtained by bringing the two components determined by f_1 and f_2 , into closer proximity. Their focal points F_1 and F_2 are nearer to each other and the interval Δ is less. Taking the same example with enlargement, $V=10$ times, Δ is found to be

$$\frac{f^2}{10} = 4.5 \text{ mm.}$$

The extent to which the two components have been brought closer together, by increasing the enlargement from 3 to 10 times is therefore:—

$$\frac{1}{3} f^2 - \frac{1}{10} f^2,$$

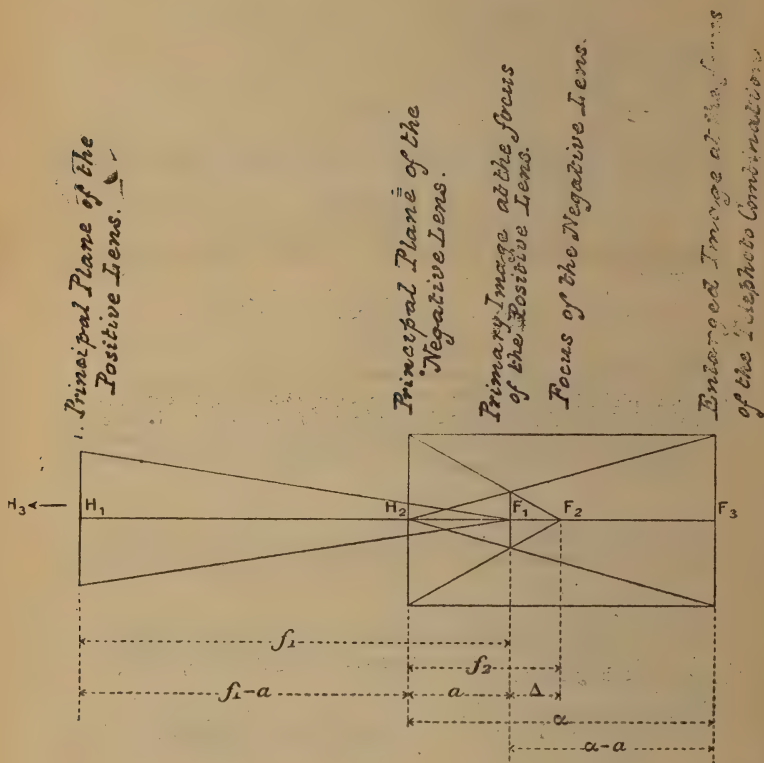
which is equal to 10.5 mm. for $f_2=45$ mm. In this way it is easy to calculate a table showing the difference of separation between the positive and negative lenses of a telephoto combination, for various degrees of enlargement:—

		mm.			mm.
Enlargement 3 times,	$\Delta_3 = 15$	—	telephoto system shortened by	starting point	0—
" 4 "	$\Delta_4 = 11.25$				8.75
" 5 "	$\Delta_5 = 9$	—		"	6—
" 6 "	$\Delta_6 = 7.5$			"	7.5
" 7 "	$\Delta_7 = 6.4$			"	8.6
" 8 "	$\Delta_8 = 5.6$			"	9.4
" 10 "	$\Delta_{10} = 4.5$			"	10.5

This scale is true of the negative lens, whatever the distance of the focus of the positive lens may be, with which it is combined.

We have thus ascertained the position of the negative component, and we have now to determine the displacement of point F_2 , which varies with the enlargement V .

A second table may be calculated for the different positions of F_1 as the centre of the final image, in various degrees of enlargement, or, in other words, we can calculate the extension of the camera carrying the telephoto combination. The displacement of the image point F_1 , which is at one extremity of the distance a beginning at H_2 , is also variable. It may be ascertained from the focus for infinity, F_1 , of the positive



component. We will therefore calculate the value of $\alpha = a$ for the degrees of enlargement $V=3, 4, 5$, etc., up to 10. (See the article by the same author:—"Du Teleobjectif," Supplement of the Bulletin de la Société française de Photographie, 1896; Mémoires et Documents du Laboratoire d'essais de la Société française de Photographie. Vol. I, p. 207.)

The following table is calculated for the example already given, taking the F, as the measuring point, and therefore =0:—

			mm.
Enlargement	$V = 3$ times	$(\alpha - \alpha)_3 = (V - 1)^2 \Delta =$	60.—
"	4 "	$(\alpha - \alpha)_4 = (V - 1)^2 \Delta =$	101.25
"	5 "	$(\alpha - \alpha)_5 = (V - 1)^2 \Delta =$	144.—
"	6 "	$(\alpha - \alpha)_6 = (V - 1)^2 \Delta =$	187.50
"	7 "	$(\alpha - \alpha)_7 = (V - 1)^2 \Delta =$	231.—
"	8 "	$(\alpha - \alpha)_8 = (V - 1)^2 \Delta =$	275.60
"	10 "	$(\alpha - \alpha)_{10} = (V - 1)^2 \Delta =$	364.50

An alteration in the focal distance of the positive component also has no influence upon these values, since they depend upon the focus of the negative lens $f_2 = 45$ mm.

The separation of the two components, which, in a measure, is the ideal length, H , H_2 of the tube connecting them, does not, therefore, determine the enlargement and extension of camera. It is decided by the separation of their focal points. The length of the tube is deduced from this for the desired purpose, and it depends upon the focal length of the positive component. Taking the focal length of the negative lens as determined, let us note the point within it where the focus of the positive component would fall, and how much extends beyond it. This portion is the Δ . If it is one-third of the length, the enlargement is 3 times, or if it is one-tenth, the enlargement is 10 times.

We may also infer that the intervals forming the scale of enlargement remain the same, when the focus of the primary image is not coincident with the principal focus of the positive lens, that is to say, when the object is not distant, but close. The entire scale is merely placed further back upon the optical axis, by the extent to which the primary image is situate beyond the principal focus.

First table: Showing in millimetres the requisite adjustment of the separation between the positive and negative lenses in the case of various telephoto attachments in general use, the necessary adjustment for a magnification of five times being taken as basis and reckoned as O.

mm.	Forms of Negative Lens.	Times of Enlargement.							
		3	4	5	6	7	8	10	mm.
-27	+3.60	+1.35	0	-0.90	-1.54	-2.02	-2.70	
40	5.33	2.00	0	1.83	2.29	3.00	4.00	
42	5.60	2.10	0	1.40	2.40	3.15	4.20	
44	5.86	2.20	0	1.47	2.51	3.30	4.40	
45	6.00	2.25	0	1.50	2.37	3.38	4.50	
50	6.67	2.50	0	1.57	2.86	3.75	5.00	
53	7.73	2.90	0	1.93	3.31	4.35	5.80	
60	8.00	3.00	0	2.00	3.43	4.50	6.00	
65	8.67	3.25	0	2.17	3.71	4.88	6.50	
67.5	9.00	3.33	0	2.25	3.86	5.06	6.75	
68.7	9.16	3.44	0	2.29	3.89	5.15	6.87	
70	9.33	3.50	0	2.33	4.00	5.25	7.00	
75	10.00	3.75	0	2.50	4.29	5.63	7.50	
78.8	10.51	3.94	0	2.63	4.50	5.91	7.88	
80	10.67	4.00	0	2.67	4.53	6.00	8.00	
85	11.33	4.25	0	2.83	4.86	6.38	8.50	
90	12.00	4.50	0	3.00	5.14	6.75	9.00	
95	12.67	4.75	0	3.17	5.43	7.13	9.50	
100	13.33	5.00	0	3.33	5.71	7.50	10.00	
120	16.00	6.00	0	4.00	6.86	9.00	12.00	
125	16.67	6.25	0	4.17	7.14	9.27	12.50	
135	18.00	6.75	0	4.50	7.71	10.12	13.50	
150	20.00	7.50	0	5.00	8.57	11.25	15.00	
200	26.67	10.00	0	6.67	11.42	15.00	20.00	

Second table: Showing in millimetres the distance between the primary image and the enlarged image in the case of various telephoto attachments in general use. The extension of camera for correct focus is obtained by adding to the measurements, given in the table, the distance in millimetres between the primary image, situate at the focus of the positive lens, and the front of the camera:—

mm.	Focus of Negative Lens.	Times of Enlargement.							mm.
		3	4	5	6	7	8	10	
27	36	61	86	113	139	165	219	
40	53	90	128	167	206	245	324	
42	56	95	134	175	216	258	340	
44	59	99	141	184	227	270	356	
45	60	101	144	188	231	276	365	
50	67	113	160	209	257	306	405	
58	77	122	186	242	299	355	472	
60	80	135	192	250	309	368	486	
65	87	146	208	271	335	399	527	
67.5	90	151	216	282	347	414	548	
68.7	92	154	219	286	353	421	556	
70	93	158	224	292	360	429	567	
75	109	169	240	314	386	459	608	
78.8	105	177	252	328	405	483	638	
80	106	180	256	333	411	490	648	
85	113	191	272	354	437	521	689	
90	120	203	288	375	462	551	730	
95	127	214	304	394	488	582	770	
100	133	225	320	417	514	613	810	
120	160	270	384	500	617	735	972	
125	167	281	400	521	643	765	1013	
135	180	304	432	563	693	827	1095	
150	200	337	480	750	771	918	1215	
200	267	450	640	833	1020	1225	16.0	

REVERSAL OF THE PHOTOGRAPHIC IMAGE AND ITS SUBSEQUENT DEVELOPMENT IN ACTINIC LIGHT.

(A Paper read before the Photographie and Microscopic Section of the Franklin Institute by M. I. WILBERT.)

Professor Francis E. Nipher, during the past year, presented several communications to the Academy of Science of St. Louis that have renewed the general interest in the subject of sensitive silver salts and their characteristic behaviour to the action of actinic light. The peculiar fact that these silver salts have the property of assuming a certain physical condition that makes them particularly susceptible to the action of reducing agents, and also that an extended exposure to actinic light brings about a reversal of this peculiar physical condition, were facts that had been observed long before Professor Nipher made his interesting communications. The feature of his experiments that was original, and that was all that Professor Nipher claimed to be original, is the possibility of developing these reversed photographic images in actinic light. The statement of this fact, when first made, appeared to be so different to what we were accustomed, in ordinary photography, that it created widespread attention, and caused numerous experiments to be made along the same lines.

Following up a suggestion that was made before the Photographic Section of the Franklin Institute some two months ago, I made several

experiments along these same lines. These experiments appeared to me to be interesting, and, to some extent, also instructive. Professor Nipher, in one of his early communications, states that a photographic plate, even after it had been exposed for weeks to diffused daylight, would still give an image if exposed to the direct spark discharge of an induction coil or a static machine, and subsequently developed, either in the dark room or in bright daylight. To test this statement I allowed several pieces of damaged photographic plates to lay exposed to bright light for ten days or two weeks, and then subjected them to a spark discharge, the resulting electrographs were then developed in bright light, and, in each case, the resulting picture showed the action of the electric spark clearly. In one case, shown here, a coin was placed in the centre of photographic plate and connected with one terminal of the induction coil. In the resulting picture we see plainly the radiations of the spark in all directions. The most interesting part of this particular experiment, however, is the fact that the area immediately under the coin and a very narrow zone around it has been completely reversed, while the spark radiations, with few exceptions, show dark against the fogged background of the plate itself. Following up Professor Nipher's own experiments, I exposed a very sensitive photographic plate under a positive, in this case a dense lantern slide, for five minutes, and then developed the same at a window with northern exposure, using an old metol-hydroquinone developer without any further restrainer. The resulting picture makes a presentable lantern slide, and represents fairly the condition of the original positive. To get an idea of the length of time necessary to obtain the best results under similar conditions, I interposed between the plate and positive a piece of heavy black paper. By withdrawing this paper gradually, I was able to make on the same plate exposures of one, two, four, and eight minutes. As will be seen by an inspection of this picture, the portion of the plate that has not had any exposure under the positive is entirely opaque; that portion that was exposed for one minute is very dense, but the portions of the picture representing the deepest shadows in the original picture are not entirely reversed. The portion of the plate exposed for two minutes is next in density, and here we have complete reversal of all portions of the picture. The parts that were exposed four and eight minutes respectively, are not nearly as dense, and differ but little in their general appearance. This is a feature that should especially be noted, as it appears to me to be evidence of a protective influence of the upper layers of changed silver salts, similar to what we would naturally expect to have had in the plates that had been exposed to diffused daylight for weeks. This experiment was gone over on several occasions, with uniform results. Even in cases where the highest exposures were as long as an hour, or the equivalent of many hours' exposure in a camera, the high lights came out quite clear, barring the general vagueness that we see in all reversed pictures.

A series of exposures made with a camera were, however, of even greater interest to me, showing, as they do, the very great range of exposure that is possible with rapid photographic plates under practically the same conditions of illumination and development. The subject was Girard College in bright sunlight at or near mid-day. The first picture is a negative made with an exposure of approximately half a second, using a Beck wide angle lens, having a 128 stop. The resulting picture developed with fresh normal metol-hydroquinone developer, came up to its present density in a little over four minutes, after being placed in the developing solution, and is, if anything, a little over-exposed. The next picture had exactly the same amount of exposure with a 16

stop, giving it approximately eight times the amount of light of the first; the plate developed very much more rapidly, but is still a very fair negative. The next one of the series was exposed for five seconds under exactly the same conditions as the previous one, using the 16 stop, and the result is still a negative, though rather thin; but when we consider that it has had 80 times the light that the first negative had, we will appreciate that the possible range of exposure is really remarkable. The next plate had an exposure of 50 seconds, and shows traces of general fog; you can see, however, that there are distinct traces of reversal; the high lights are completely reversed and almost clear. This plate would probably come somewhere near the so-called zero condition, where the positive and negative conditions of the plate would nearly balance each other, and give, as result of this a general fog. Again increasing our exposure, this time to ten minutes, and developing the picture in the dark room, we obtained a completely reversed picture that is rather dense in the shadows on account of the activity of the developer; under these conditions, this plate did not require more than three minutes in the developing solution, and appeared to flash up very rapidly. The next picture was given the same exposure, but developed at an unprotected window having a northern exposure—in fact, the same window from which the plate had been exposed in the camera. This required eight or nine minutes to develop, and the conditions of the development were quite different. When the plate was first taken from the camera, there was plainly seen a distinct outline of the picture as a negative. On placing the plate in the developing solution this negative image gradually faded until the plate was perfectly blank, then the edges of the plate that had been protected by the holder began to darken, and, following this, the positive image gradually but slowly developed, the process requiring at least three times the time that was necessary in the dark room.

Some further experiments were made with a view of testing the action of various reducing agents; the exposure in these cases was 25 minutes, and more or less satisfactory results were obtained by using pyrogallol acid, amidol, eikonogen, metol, metol-hydroquinone, and hydroquinone as the reducing agents. The first four did not give very satisfactory results, as their action appear to be too rapid and rather irregular; the fifth was the developer used in the experiments alluded to above; while the sixth, hydroquinone, was used with and without an alkali, with interesting results. The first picture which I show you, had the normal amount of alkali, as advised in the formula given by the manufacturer of the plates that were used. This plate shows up quite clearly and is quite black. The next plate was developed with a developer having but half the amount of alkali, and, as you can see, it has a distinctly brown cast of colour; it was also slower in development, although not markedly so. The third plate was developed without the addition of any alkali, and presents a reddish-brown appearance in colour, though sharp and distinct in all details of the picture. Speculation as to the principles involved in these processes are perhaps out of order, but it appears to me as though the action of light on sensitive silver salts was in the first stage a purely physical one, disarranging the equilibrium of the molecules of the silver salt and making them susceptible to chemical reducing agents; prolonged action brings about a chemical change that produces opaque metallic silver or a silver oxide, and this in turn protects the silver bromide molecules immediately below it from further action of light; the physical change is going on in other portions of the plate, and these in turn are susceptible of reducing by proper chemical agents, while the portion that has been acted on

chemically is not. The change brought about by reducing agents is much more intense and opaque than is that produced by light, thus giving us a dark picture against a grey or hazy background. As evidence of this I would say that so far I have not seen any reversed pictures in which the high lights were represented by perfectly clear glass. More evidence that the ultimate action of light is chemical is found in the fact that we may expose a plate under a negative for a sufficient length of time to produce the outline of the picture distinctly, then fix the resulting plate in hyposulphite solution and still retain the faint outline of the positive, and this in turn may be intensified so as to be distinctly visible. Under proper conditions we would no doubt be able to make photographic negatives in this way without the use of a dark room; that is, by first dissolving out the unchanged silver salts in a fixing bath, and subsequently intensifying the very weak but distinct image remaining on the resulting plate.

EXPOSURE.

(A Paper read before the Manchester Amateur Photographic Society, and reprinted from the "Photographic Record.")

The beginner soon discovers that his success largely depends on the time the sensitive plate is exposed in the camera, or, in other words, how long the lens is uncovered. It is only a few years ago that the wisecracks in the art invariably told the young hand that the only way to acquire this knowledge was by experience—that is, by first making many failures. But of late years the problem has received more attention, and almost complete accuracy can now be attained by following certain first principles. In exposing a plate, it is shut up in a camera, and illuminated through an opening in the lens by light reflected from the object or objects being photographed. We have here four influences which are subject to variation, and a variation in any one affects the length of exposure required. They are: Plate, opening of lens, subject, light; and in any plan of estimating exposure these must be considered. The reason why such a thing as correct exposure is necessary lies in the limitations of the sensitive plate, and it is well to examine in a plain, non-technical way what these limitations are. If a plate is exposed in different parts to increasing amounts of light and then developed, we get, of course, varying densities, as shown on the screen. Now, with every particular plate there is a *minimum* amount of light, below which amount no impression is made on the plate at all, this minimum being marked by a cross on the slide. At the other end of the scale there is a *maximum* amount of light, beyond which amount any increased exposure does not give a corresponding increase of density on the plate. Now, the object of exposing a plate is that all the varying amounts of light in the subject shall be represented by varying densities in the negative, and for a plate to be correctly exposed the highest light must not make a greater impression on the plate than that marked by a cross on the screen; for if the exposure be above this, both high lights and some of the lighter tones will be represented by equal densities in the negative, and the familiar grey appearance of over-exposure will result. On the other hand, the exposure must be sufficiently long for the darker details of the subject to make some impression on the plate, or the familiar "clear class in shadow" of under-exposure will result. The real quality of the plate depends upon the distance between these crosses.

If the distance is great, we have a plate with plenty of backbone or latitude, and a considerable variation can be made in the camera exposure without the high lights or shadow detail getting respectively either above or below the crosses. In a poor quality plate—and it should be noted that the quality has nothing to do with the speed—the crosses are nearer together, and very little variation can be made in the camera exposure without getting over or under exposure.

Now, the sole object of correct exposure is to get the varying amounts of light reflected from the subject represented on the plate by densities between the crosses, and various plans have been devised for estimating the value of the four varying influences of plate, diaphragm, subject, and light, and from these estimates deducing the exposure to give. The ever-varying light was the influence which first attracted attention, and Vogel, about 1873, drew up a table of rough estimates of the value of light at different hours of the day and at different seasons. The slide gives a condensed idea of this table, which was followed in principle by Scott, Hurter, Driffild, and others. It suffers from the grave disadvantage that any variation from the average light caused by dull weather, clouds, or clear atmosphere has to be allowed for by personal judgment. In 1887 Burton published a rough estimate of exposures for different subjects in bright and dull lights. Burton expressly stated that this table was a rough guide only, and as an accurate classification of subject, it is open to the objection that it really includes the lighting also. Thus, a stone font in the interior of a church would be classified as 100 to 800, whereas if the same font were in the churchyard it could only be classified as "landscape with foreground" as 2. The Vogel (or Scott) light tables were soon combined with Burton's light tables, and with the necessary table of variation for different sizes of diaphragms, and on these combined tables all the existing exposure tables are based, as well as all those slide calculators and tables the variation of the light from the average and also the lighting of the subject has to be estimated, and the human eye is notoriously ill adapted for estimating the actinic value of the light. For a good many years actinometers have been used by a few advanced photographers. In these instruments the relative value of the light is given by the time a strip of sensitive paper takes to darken to a standard tint, and, other things being equal, the exposure will always be in proportion to this actinometer time. Since Abney adopted bromide paper instead of chloride paper for actinometers, their readings have been found to be reliable, even when comparing the dim light of an interior with the bright sunshine outside, and the efficiency is still greater since the steadfast paper (which never assumes a red tint in damp weather) was introduced. Although before the year 1890—the year I invented my exposure meter—several attempts had been made to utilize the reading of an actinometer with the aid of slide rules to estimate the exposure, the mistake had been made, as in Ackland's card calculator, of using Burton's subject classification; and, although the out-door light was tested by actinometer, any variation for woods, interiors, etc., became a matter of estimation. In my system, introduced for the first time in 1890, and now followed by thousands using my exposure meter and one other instrument imitating mine, I test with the actinometer the light actually falling on the subject, and this being done, the lighting need not be considered in classifying the subject. My system, therefore, is essentially different from the older plan, and does not use the same tables.

Of the four factors named on the screen, the first three—light, plate, and diaphragm—need only be considered in most cases. It is only when the reflecting capacity of the subject varies largely from the average that subject need be considered. As regards the classification of speed

of plate, this is not the time to enter into the vexed question of plate speeds. Suffice it to say that plates even of one brand vary in speed from time to time, that the Hurter and Driffield system of speed-testing is practically the only precise plan in use, and that although several makers mark all their boxes with H. and D. speed numbers, the different makers' numbers have different values, owing to want of uniformity in standard light and developer. For some years I have repeatedly tested all the plates on the market, and publish a speed card, giving the relative speeds for my meter. This is kept in type, and new editions printed frequently. As regards the influence of diaphragm, the camera can be regarded as a room lighted by a window (the opening of the lens), the plate being on the opposite wall to the window. In a room 8ft. long lighted by a window 1ft. square, the opposite wall would receive just the same illumination as in a room 8yds. long lighted by a window 1yd. square. Therefore, when an optician marks his stop $f/8$ it has a definite value, whatever the focus or kind of lens. Let us now glance at the use of an actinometer in estimating light variation caused by the interference of surrounding objects. (A number of slides were shown, illustrating this point and showing how the actinometer held so as to test the light actually falling on the subject made allowance for various obstructions shutting out the illuminating sky.) I wish to note that in my exposure system I make no variations in the value of the subject caused by these changes of lighting. In the exposure-table plan, a variation of at least 1 to 100 would be required for the subjects illustrated, ranging from landscape to interior. In my system I value all subjects of average colour, whether they are landscapes, buildings, portraits, or interiors, at 100, and it is only when there is exceptional variation in reflecting capacity of subject, as snow scenes, sky, sea, or white objects, that variation need be made on account of subject. (Slides illustrating the different subjects for which a variation in subject value is required were thrown on the screen.) Where the camera has to be racked out for copying near objects or for enlarging, a fifth factor, which I term f , has to be considered, and here the extra f scale in the standard meter becomes useful. In the simpler pattern meters even the subject scale is omitted, and it is presumed that the subject value is 100, as it is in nine cases out of ten. In the tenth case a variation from indicated exposure can easily be made.

CALCULATING WITH SLIDE RULES.

Now let us see the principle by which the variation for plate, diaphragm, and light can be calculated in practice. These three factors, with the final one of exposure, are the smallest number which can be considered in any exposure meter. The means of calculating is always based on the ordinary slide rule, and countless variations can be made on this. (A lever slide illustrating the calculation was shown.) It is easy to devise a bogus simplicity by reducing the number of the scales, but the trouble in using a meter is in hunting out the four values, and I have always thought that it is really most simple to provide a separate scale to each factor. The meter can then be set for the two factors, plate and diaphragm, which may not require alteration that day, and only the figures for light and exposure have to be sought for. Where two scales only are provided, all four values must be hunted out each time. In the dial meter—(an illustration of working this was thrown on the screen)—only the figures actually wanted appear in sight, and the meter remains set for plate and diaphragm. The eye is therefore not confused with a large number of figures.

RELATIVE STANDARDS OF SPEED.

As at different times articles have appeared in the BRITISH JOURNAL ALMANAC, giving the supposed relations between the speed values in my meter and those in the Wynne meter, I presume that the comparison has same interest. I throw on the screen an illustration of the slide rule calculator, which, in conjunction with a separate actinometer, was the first exposure meter issued by Mr. Wynne. It came out in 1893—three years later than mine. Simple numbers are used to express the speed of plate; the standard of speed is identical with that in my meter, and the result of a calculation with the same figures is the same. For example, my standard for a plate speed l was that with $f8$ and two seconds actinometer time (best summer light) it would require for an average subject two seconds exposure. The Wynne slide rule, which is an application of the ordinary carpenter's slide rule, gives the same result, the central row of figures serving both for actinometer seconds and for exposure seconds. This identity with my system can be verified by reference to the illustration of the slide rule in the BRITISH JOURNAL ALMANAC of 1894, p. 820. As Mr. Wynne selected the Manchester Amateur Photographic Society as a medium of relating how *he* worked out the plan of his instrument, I feel bound, also, to record the fact that in a letter dated September 1st, 1892, Mr. Wynne, in ordering a refill for my meter, mentions his having used two previous refills, and winds up: "I find it very useful and reliable." In the subsequent watch-shaped exposure meter issued by Mr. Wynne, he omitted the third row of figures, and without making any changes in his (or, rather, my) standard of calculation, he now called the speed previously called l by the name of the f value opposite it on the scale—namely, $f8$. The corresponding values of Watkins' plate speeds and Wynne's plate speeds can, therefore, always be found opposite each other in the illustration in the almanac I have mentioned.

INTERIOR WORK.

When photographing indoors the length of exposure has long been a difficult problem, which the exposure tables scarcely attempt to solve. The judgment of the eye, too, is apt to be at fault in dealing with feeble lights, and it is in this work that old and experienced photographers have most frankly acknowledged their indebtedness to the actinometer. Practically, however, no one cares to spend the time in testing indoor light before making an exposure; and it was my introduction of the plan of using such a stop in the lens that the actinometer and camera exposure should be equal, which brought the actinometer, or exposure meter, into use indoors. With this plan the actinometer is placed in one of the darkest parts of the subject, and the lens uncapped at the same time, and left uncapped until the paper darkens to tint. A quarter tint suitable for this plan is provided with all meters and the new actinometer. With Ilford ordinary and $f22$, the camera exposure will always be the same time as the darkening to quarter tint.

Using rapid plates and modern anastigmat lenses, we sometimes want to use a larger stop than that proper for the quarter tint. The first visible darkening of the sensitive paper is equal to a sixteenth tint, and with a rapid plate of 150 on my scale, $f22$ can be used and the camera exposed for just the time which elapses before the paper commences to darken.

PINHOLE WORK.

Good photographs can be taken without a lens by means of a pinhole aperture, and the exposure for these can be calculated with exactness. I show a few examples. For every distance from plate to pinhole there is a size hole which gives the best definition. In the little book, "Exposure Notes," I give a table of the right-sized sewing needles to make these holes for each distance, and also the diaphragm, which has an area of 60 times the pinhole.

HAND CAMERA WORK.

It does not seem at first sight advisable to calculate exposures for snap shots, but I found, working in Switzerland, with a shutter adjustable to slow speeds and a stigmatic lens opening to $f6$, a great comfort in the little hand-camera calculator screwed to my camera, telling at a glance what shutter speed to use with a particular stop, or vice versa. Here is a scene taken with slow shutter in the dark shadow of pine woods, which I should not have attempted if the actinometer and slide rule had not told me it was feasible. (Other instances of the use of the meter amongst the towns and glaciers of Switzerland were shown, both snap shots and time exposures being developed together by timing only.) I will now give a few illustrations of three-colour work, in all of which I used the actinometer for determining the exposure through the blue screen. In concluding this outline (for much is omitted) of systematic exposure, let me remark that I deal only with the tools of our science, and not with that distinct branch, the artistic use of the tools. A man may use over or under exposure for artistic effect, but let him not despise the methods providing a definite standard, which he is at liberty to follow or not, as the mood seizes him.

ALFRED WATKINS.

THE HALF-TONE TRICHROMATIC PROCESS.

(A Paper read at the stated meeting of the Franklin Institute, held Wednesday, November 20th, 1901, by F. E. Ives.)

Until recently, all of the finest colour printing has been done by the chromolithographic process, employing from seven to twenty stones, with as many inks and impressions, and the necessary drawings upon these stones have been made by specially trained lithographic artists. It has long been thought by some, that, in accordance with the trichromatic theory of colour vision, three printing surfaces, colours, and impressions might be substituted for the seven to twenty of the chromolithographer, and that the preparation of these surfaces might be accomplished by photography. The only commercially successful development of this idea to-day is by the employment of three half-tone process blocks made from a trichromatic negative colour record, and printed with three coloured inks in the type press. It will no doubt interest those present to know that the first public exhibition of a reproduction by this method was at the Novelties Exhibition of the Franklin Institute, in 1885.* This example was made by me in 1881, when I was the only man in the world engaged in the production of half-tone process blocks†

* Catalogue of the Novelties Exhibition, 1885, p. 36. See also *The Photographic News*, London, Sept. 5, 1884, first page.

† U.S. Patent, No. 246,601, Aug. 9, 1881.

and ten years before anybody else is known to have made a half-tone trichromatic reproduction. The time was not then ripe for the commercial development of such a process, which demands conditions in the printing office which have been realised only after many years, by a process of evolution which was greatly stimulated by the introduction of the half-tone photo-engraving process.

The half-tone trichromatic process was first commercially exploited less than ten years ago, and is already a competitor of chromo-lithography, because cheaper and more direct; but the quality of the product has been, up to the present time, so uneven as to have brought the process somewhat into disrepute. This state of affairs is due largely to the fact that such success as is achieved generally depends very largely upon the degree of skill available in the correction of errors and defects in the operation of the process by re-etching the half-tone blocks—a procedure technically and appropriately known as “faking.” I have always contended that conditions could be secured which would make it possible to obtain the best results almost automatically, and it is my purpose in preparing this paper to show how this may be accomplished. As in all other practical forms of the trichromatic process, we commence with three photographs to represent the analysis of all colours into proportions of three “primary” or fundamental colours, and it is evident that correct results cannot be obtained without the aid of handwork, unless this photographic record correctly differentiates all the hue and luminosity values of the copy. How to secure this perfect differentiation of hue and luminosity value is a problem which certainly baffled the earlier experimenters in trichromatic photography; but its solution by working to the Maxwell colour curves, as first proposed by me in a paper read at this institute in 1888,† has been sufficiently demonstrated by the results obtained in the photo-chroscope. In the photo-chroscope, however, we make up our white light, not of all of the spectrum rays, but of a mixture of three practically isolated groups from the two ends and middle of the spectrum. If we were to employ all of the spectrum rays equally, but sharply divided into three groups, we should find that when we attempted to reproduce certain hues of the spectrum, they would be somewhat degraded in purity, because pure spectrum reds, greens, and blue-violets cannot be reproduced by any mixtures of spectrum rays. From this I have argued that colour prints from Maxwell curve photographic records, if made upon paper which reflects ordinary white light, must show a little degradation of colour. Comparison of such prints with the originals and with the photo-chroscope reproductions shows that this degradation, otherwise almost unnoticeable, actually occurs and disappears when the prints are viewed in a white light made up of a mixture of isolated groups of red, green, and blue spectrum rays. From this it might be argued that the photographic colour record which is suitable for one purpose is unsuitable for the other. The fact is, however, that for synthesis by any other light than the artificial white of the photo-chroscope, no trichromatic analysis can be theoretically perfect; and I hold that the Maxwell curve analysis introduces, even for synthesis in ordinary white light, less serious errors than any other; and that the best compensation for the modicum of degradation of purity should be sought in later stages of the process, in the lining of the process blocks, the absorption and transparency of the printing inks, and the paper and press-work. This question has been the subject of much controversy, and as it would take

† *Journal of the Franklin Institute*, January, 1889, p. 54. U.S. Patent, No. 432,58, July 22, 1890.

a volume to fully elucidate the subject, I will only add here that the demonstration which I now present is based upon Maxwell curve analysis, the results of which, under the conditions which I have secured, will speak for themselves.

The perfection of each individual element of the trichromatic negative record depends upon the relations of the source of illumination, the absorption of the selective colour screen, and the colour sensitiveness of the photographic plate, one to another. Each of the three negatives may, however, be substantially perfect in itself, but out of key, so to speak, with the others, though being relatively less or more exposed or developed to lesser or greater density; and in the practice of the process this want of harmony of relationship is a source of error quite as serious as errors of principle in the analysis, and it is probable that two-thirds of the "faking" that is found necessary in practice is due to errors of this character, which may be introduced in any of the photographic operations, or even in the etching process, so long as the three operations are conducted separately. My cure for this difficulty consists in the production of the three images of the colour record by one exposure upon a single sensitive plate, for which purpose I have devised several special cameras, one of which,* together with triple negatives produced in it, is submitted for examination. After once correctly adjusting these cameras, triple negatives can be turned out with perfect regularity, in which the relation of the images one to another, in exposure and density, is bound to be correct. The printing upon the zinc or copper plate and the etching is also thereby reduced from three operations to one. The importance of this procedure from a labour-saving point of view, is very great, because it saves much time and labour in the initial stages of the process, besides eliminating errors which frequently necessitate costly and time-consuming "faking" operations in the later stages. In the most approved method of producing the half-tone process blocks, the half-tone process negatives are made through cross-line sealed screens, in order to translate the smooth gradations into definite line and dot, as is required by the typographic printing process. There are a few operators who employ the cross-line screen in the first instance, making the half-tone negative directly on the colour-sensitive plate; but very much longer exposures are then required, and the translation of body shade into line and dot is far less definite and satisfactory than when a transparency from the smooth colour record negative is made the copy for a half-tone process negative by the wet-plate process, or on special "contrast" dry plates. My special triple cameras can be fitted with the cross-line screens, so as to make the line negatives direct; but after some experience of both methods I at present favour making first a triple colour record, then a contact positive, and from the latter a triple half-tone process negative in the copying camera. Allowing for the saving in time in making the original exposure through colour screens, no time is lost, and the half-tone process negative, made by the wet-plate process, or on a special "contrast" dry plate, is of a quality not obtainable by the first method.

Compared with the most usual procedure, fifteen operations are thus reduced to five,† and compared with the shortest method practised with a single camera, nine operations are reduced to five, with gain in the

* U.S. Patent, No. 668,989, February 26, 1901.

† Three separate colour-screen negatives, three separate transparencies, three separate half-tone process negatives, three separate prints on the zinc or copper plates, and three etching operations.

‡ One colour record negative, one transparency, one half-tone negative, one print on copper or zinc, and one etching.

quality of the screen process negatives and elimination of the defects commonly introduced by separate exposure, development, printing, and etching. If the screen negatives are made direct with the triple camera, the total number of operations is reduced to three. Another reason for favouring the use of a transparency as copy for the half-tone process negative, is the fact that original triple-colour records can most advantageously be made on a standard size of plate in a camera which gives images either larger or smaller than the plates required, and the images readily brought to the required size in the copying camera when the triple half-tone process negative is made. The original triple negative is then available at any time for plates of different sizes, or with screens of different degrees of fineness, or for Kromskop slides or colour print lantern slides, or for any other kind of trichromatic process reproduction which may at any future time be desired. Three of the ruled cross-line screens are used in the copying camera in front of the one negative plate, and the arrangement is such that three small images can be made on plates of one size, or three larger images on a larger plate without change of screens or alteration of adjustment. It is necessary to use three screens in order to have the lines differently disposed in the different images to avoid an offensive watered-silk pattern. This disposition of the lines at different angles to avoid this effect is seen in my original example of 1881, a copy of which I have with me, and was patented by someone else twelve years after. By the means which I have described, sets of half-tone trichromatic printing plates may be produced with great regularity and precision, frequently requiring no re-etching to perfect them, and never any considerable amount of it. It remains only to reduce the printing to one run through the press, in order to eliminate errors due to unequal inking and unequal expansion of the paper with changes of atmospheric condition, to make the production of half-tone trichromatic process reproductions as nearly as possible automatic, and of the highest average quality. Already it has been proved that the printing can be done successfully upon this principle with a special press which is now on exhibition in this city, but was not available for printing my specimens. They have been run off on an ordinary treadle press without any overlay or other "make-ready." The depth and "openness" of the etching of the plates, and the colour and transparency of the inks, are very important factors in this work. To fulfil theoretical requirements, the ink must be perfectly transparent and as specifically anti-chromatic as possible to the respective "primary" colours in ordinary white light. If they absorb too broad bands of the spectrum, or if the blocks are not etched sufficiently open, the colours will be degraded with black—"muddied," is the technical term. If they absorb too narrow bands of the spectrum, or if the two top colours are not perfectly transparent, the superposition of the three inks will not produce a good black, and some colours must be falsely rendered. If the absorptions are diffuse, a little difference in the relative amounts of the inks put down will make great changes in the colours of the print. If the absorptions are in sharply-defined bands, which meet each other over the Fraunhofer *D* and *F* lines of the spectrum, after putting down enough to make a good black by superposition, an excess of any one will scarcely alter the colours of the print except there be lateral spreading, increasing the area of the printed lines. Inks having broadly overlapping absorptions, or not perfectly transparent, produce a quite different hue when printed in lines side by side than when the lines superpose, while perfectly transparent inks, with sharply defined absorptions which just come together in the spectrum, will produce a tint of

almost exactly the same hue where the lines overlap and where they do not. All of these facts should be taken into consideration in the selections of printing inks, and constitute a basis for predicting what will prove most suitable. The inks which I employ are a *minus* red (peacock blue), the absorption of which is strong and pretty even from the red end of the spectrum right up to the *D* line, but falls off to nothing in the greenish yellow; a *minus* green (crimson), the absorption of which is strong and pretty even from over the *D* line to the *F* line, falling quickly to nothing outside of those limits; a *minus* blue (yellow), the absorption of which is strong in the violet and blue, and falls off gradually between the *F* and *E* lines. A mixture of these three inks to make a transparent neutral gray, when analysed in the spectroscope shows somewhat more absorption in the yellow and blue-green of the spectrum than in the red, green and blue-violet parts, proving that they effect a colour synthesis in some degree approximate in character to that in the photo-chroscope, while still in bands sharp enough to make easy printing without the hue depending too much upon the flow of ink, or whether the lines or dots fall side by side or in superposition. These inks are not quite ideal, but they are the nearest approximation that I can now obtain, and they yield more accurate rendering of colours from Maxwell curve-record printing plates than the "regular" three-colour process inks.

THE BIOSCOPE.

(A Paper read before the Edinburgh Photographic Society by
JAMES BUNBLE.)

The bioscope or cinematograph has indeed a wonderful and most interesting history. Although only a few years old, it has had marvellous and rapid developments. It has also procured for itself a great popularity, which seems to be ever on the increase. Twenty years ago we had beautifully painted canvases, called panoramas or dioramas, which revolved from one roller to another, and thus displayed before their audiences the beauties of nature at home and abroad without the discomfort of long railway journeys. Now we have the animated or living pictures, which, thanks to photography, and the great geniuses who spend their time working up this branch of science and art, are thrown on the screen, depicting life and scenes and events just as they happened. And so realistic are some of those scenes represented, that it is only necessary to mechanically reproduce the sounds which would take place, such as the firing of a cannon or pistol, the hammering on an anvil, or the rumbling sound of a waterfall, to make one feel they were witnessing the actual scenes and not a series of photographs. The zoetrope or wheel of life may be taken as the earliest attempt at animated pictorial effects, and although a wonderful invention, it was a very crude instrument with its badly-drawn pictures. The numerous attitudes through which a man or animal passes when in active motion are not perceived by the eye. So rapidly do they succeed one another that only a general impression of the whole is conveyed to the mind. This general impression, though perhaps satisfactory (from an artistic point of view) when shown in a single picture, cannot be expected to afford sufficient grounds for the preparation of an analytical series of diagrams representing the successive phases of a motion which is only perceived as a whole. With the advent of instantaneous photography many possibilities were placed in the hands of scientific men, and numerous were the experiments in analysing, by means of the camera, the various motions of man and animals. Our journals and magazines were soon flooded with reproductions of photographs of horses jumping or

galloping at full speed, and living movements of various kinds. Some of the positions of these movements seemed quite impossible, and the camera appeared to misrepresent things in a most erroneous manner. The correctness of these photographs can now, however, be easily proved when reproduced in the cinematograph, and the incongruous-looking pictures made to move along on the screen in life-like reality.

In 1877, Muybridge, for the purpose of investigating animal motions, laid out a course or running path, one side of which was bounded by a white background. Along the other side was ranged a series of separate cameras. A trotting horse was then caused to pass between the lenses and the background, at the same time automatically releasing their instantaneous shutters. Although these photographs were taken at too long intervals between each to be of any practical value for viewing as an animated picture, Muybridge did produce a series of photographs with this object, and even succeeded in projecting them for the illustration of his lectures on this subject on the screen. Anschütz in Prussia also carried out very successful experiments, and devised a shutter and camera in which successive images were taken on a rapidly moving plate or series of plates in one camera and with one lens. In 1889 he also devised an instrument (he called it the living wonder) by which the transparencies from these negatives could be viewed. The successive photographs were placed on the periphery of a wheel which revolved behind a lens, and by an ingenious arrangement each picture was illuminated by an electric spark as it came behind the lens, no shutter being used when viewing the transparencies. These experiments were all carried on on glass plates, which were exceedingly difficult to handle and very unsuitable for these purposes. A great many investigators now entered the field and carried on these experiments, but it is not necessary to weary you with details. Great advances having now been made in the manufacture of flexible, transparent celluloid film, coated with sensitive emulsion, on which really reliable photographs could be taken, Edison, following up the various experiments which had now been made in the taking of pictures on glass negatives, produced on a long flexible film a series of photographs taken in rapid succession, and also succeeded in exhibiting them in his wonderful invention, the kinetoscope. The films on which Edison took his photographs were almost 40 feet long, each picture being one inch broad by $\frac{5}{8}$ inch high, and this is the gauge adopted for the present-day cinematograph. These small pictures mean a great saving in film and materials compared with the usual size of three inches adopted for lantern projections. There are a few other sizes used, notably the one for the biograph, in which the pictures measure 2 inches by $2\frac{1}{2}$ inches. This latter, although it has advantages, is counteracted by the enormous amount of film required. The mechanical difficulties are also increased by the moving of a greater mass of film. A film measuring 40 feet with the Edison gauge will contain over 600 of these small pictures.

PERSISTENCE OF VISION.

Before proceeding further it might be well to say a word or two on this peculiar phenomenon, which we call persistence of vision. This peculiarity of our vision was well known to the ancients, and is mentioned by one of our early writers as far back as 61 B.C. Everyone knows the experiment of revolving a stick with a red charred end in the air when in a darkened room, how it appears to the eye as a complete circle of red light, and yet we know the red point can only be in one place at a time. A similar result may be obtained when a spinning top with a coloured spot on one side is spun round; the spot will appear as a complete circle on the spinning top. This points to the well-known fact that when an image is formed on the retina of the eye it is not immediately erased when the

cause of the image is removed. The persistence or length of time ranges somewhere from $\frac{1}{3}$ to $\frac{1}{15}$ of a second. It is therefore necessary that this short period of time should elapse before an image formed on our vision is blotted out, so to speak. It is owing to this physiological phenomenon that we are able to produce by means of the cinematograph and such-like instruments the so-called living pictures, which are in reality optical illusions. It is therefore necessary when showing an animated picture that an intermittent motion be given to the series—that is to say, a single picture is shown for a fraction of a second, then as quickly as possible the following picture of the series is jerked into its place. During this rapid change an opaque shutter intervenes to cut off the light. This rapid change must not occupy more than $\frac{1}{3}$ to $\frac{1}{15}$ the space of time that the picture is shown to the eye, so that you have picture following picture in rapid succession, and owing to the persistence of our vision, or retaining power of the eye, the pictures are so blended into one another that they appear as one animated picture. The camera used in cinematography is optically and mechanically similar to the projection apparatus. It is practically a magazine camera of enormous capacity, being made to hold a film ranging from 100 to 600 feet in length, on which 1,000 to 1,400 of these little photographs may be taken (that is, surely, an ideal camera for the snapshotter). A lens of very large aperture is generally used. The attention and skill of our best lens makers have been turned towards the production of these lenses, and so satisfactorily have they attended to their business that very good photographs have been taken even when the weather was far from being propitious. It is very necessary, therefore, to be provided with a really good lens, as it so often happens that important and interesting events take place when the sky is overcast. Like all kinds of photography, however, a good and suitable light is always desirable. To go into a full description of the mechanical arrangements of the taking and projecting apparatus would prove very tedious, but it might be interesting to mention a few of the essential details of these machines. Everyone has his own ideas as to which is the best apparatus. I shall not discuss the merits and demerits of each, but rather give you the principles of how those pictures are taken and projected.

CAMERAS FOR CINEMATOGRAPHY.

A great many eminent names are connected with the inventing and perfecting of the various apparatus for cinematography. In 1895 Messrs. Lumière in France were triumphing over their difficulties while Mr. Birt Acres in England was perfecting his machine. Mr. Acres photographed the University Boat Race, 30th March, 1895; but Lumière had filed his patent a few days earlier. They were each, however, quite independent workers. I shall only give a brief description of our present-day camera for taking these animated pictures. You have a box pattern camera fitted with a lens which is usually interchangeable. So as to get various lengths of foci it must have a wide aperture, and be fitted with Iris diaphragm and focussing pinion, an adjustable focal plain shutter, a dark box containing the unexposed spool of film, and a spool for receiving the film after exposure. The mechanism consists of toothed wheels and pinions and two sprocket drums over which the film passes as it is being exposed. There is an eccentric motion given to the film as it passes behind the lens and shutter, causing the film to remain stationary when the lens is open, making the exposure; then when the shutter closes the lens, the film is quickly passed forward and is ready for another exposure. In this way the film passes along from one spool to the other until it is all exposed. The entire mechanism is operated by the turning of a handle, which must be kept moving at a uniform speed. The pictures are in this way taken in series

and in very rapid succession. Hundreds of these little photographs can be taken on one film in this way, 50 feet of the film being passed through in a little over a minute, and as the pictures are only $\frac{5}{8}$ inch high, you can easily calculate the large number of pictures that are exhibited in the course of an evening's entertainment. One maker claims that his camera is constructed to take from 50 to 1,500 feet of sensitive film, which makes it possible to take a continuous cinematographic picture of events lasting thirty consecutive minutes without reloading. This may be possible so far as capacity in the machine is concerned, but it seems to demand a severe tax on the capacity of the operator to keep his handle turning at a regular speed for half an hour.

DEVELOPMENT.

Having secured our photographic image on the sensitive film, we must proceed to develop it. This may be done by winding the film on a circular drum, and the whole revolved in a shallow trough or developer. The subsequent processes of washing, fixing, and final washing and drying may be completed before it is again removed from the drum. This completes your negative. Now your positive film for projecting a living picture is nothing more after all than a multiple lantern slide, and its production is therefore in all respects similar, with the exception of the care required to secure absolute registration of each picture with its predecessor. The negative and positive are now passed through a machine with a sprocket wheel, which holds the films in exact registration, each film passing independently and continuously from one spool to another, but held in close contact, negative uppermost, between two plates under a shielded incandescent electric lamp. The development of positives is conducted in the same manner as that of negatives, but the greatest care must be taken regarding density and gradation. Light is of extreme value, and the animated pictures must be kept thin owing to the great extent of magnification required for the small picture. At the same time all detail must be secured. White spots and sparkling points have a distressing habit of drawing attention to the failings of flicker and incorrect registration, even when only present in a slight degree, and must therefore be avoided. The registration of a film is a very important item in the securing of the projection of a good animated picture. The Edison gauge and perforation is the one generally adopted, the extreme width of the film being $1\frac{1}{8}$ inch. There are four perforations to each picture. Special machines have been invented for the perforating of these films, but with all the accuracy of these machines we find that certain films do stick and tear and get out of gear in our projecting apparatus. This is very annoying to an audience, but still more so to an operator, should one of these films be handed him without his first having tried it in private through his apparatus. It is therefore necessary to try every film through your machine before showing them in public. If you take almost any two films and place them together and compare their perforations, you will find that they will agree for a few inches only.

THE BIOSCOPE.

There are many good projecting machines to be had, but I think it will suit our purpose best to describe the one I have at the other end of this room, and by which I intend to throw a few of those living pictures on the screen. I have here the latest make of the bioscope. To look at it seems very complicated, but it is really very simple. The entire mechanism is operated by the turning of the handle. You have first the upper spool containing the film before it has been exhibited. From this the film is unwound and passes over a sprocket drum to the film trap, which is pro-

vided with springs which press on each side of the film and keep it in position, for it is at this point the picture is shown. There is also a metal mask at this point with a rack and pinion for accurately centring the picture as it passes behind the lens. The film then passes over the eccentric roller, which gives the intermittent movement. Then the film passes over the lower sprocket drum, and is wound on to the lower receiving spool. We have also a single blade shutter which revolves in front of the lens, cutting the rays of light at their crossing point. The shutter is adaptable, and must cut off the light as the eccentric motion shifts the picture. There is also an automatic shutter which intercepts the light and heat from the film, which falls down in the case of any stoppage of the machinery, and thus prevents the firing of the films. Several cog wheels and pinions are acted on by the turning of the handle conveying the various motions to their respective parts. I trust I have made the mechanical description clear to all, or at least conveyed the idea of its workings. The object to be aimed at in the mechanism is to show one picture at rest for a fraction of a second and then to immediately follow it with the next of its series. It is impossible that this change can take place too quickly so far as the optical viewing is concerned, but it is another matter to get the mechanism to act intermittently and very quickly without tearing the film. I have said nothing about the light used for the projection of these animated pictures. My attention has been chiefly given to the mechanism. The light is contained in an ordinary magic or optical lantern body, with its usual condenser. Any illuminant may be used, but the limelight and the electric arc certainly are the best. The limelight gives a powerful and at the same time a very soft light; but when in a very large hall and a large screen is used, with long focus lenses to throw your picture from the back of the hall, then electric light is necessary. Mr. Urban, Managing Director of the Warwick Trading Company, has very kindly specially prepared for me a few lantern slides to aid me in describing the mechanical apparatus, along with a few slides of the developing room and drying apparatus, &c. I will then follow these slides by an exhibition of the cinematograph and series of animated pictures.

THE LUMIERE PROCESS OF COLOUR PHOTOGRAPHY.

The following practical details of this process are published by the Lumière N.A. Company, 4, Bloomsbury Street, London, W.C., who supply the necessary materials for working it in a simplified form:—

It is necessary to procure three colour screens or light filters, and those employed by Messrs. Lumière are made as follows:—Optically worked glass is evenly coated with a 10 per cent. solution of gelatine, as perfectly filtered as possible, allowing 5 c.c. of gelatine to each 10 cm. of glass surface. These must be dried on a horizontal table and in a position absolutely free from dust. When thoroughly dry, immerse these coated glasses in the following staining solutions carefully filtered:—

GREEN SCREEN.

Solution of Methylene Blue N, at $\frac{1}{2}$ per cent.	5 c.c.
Solution of Auramine G, at $\frac{1}{2}$ per cent.	30 c.c.

BLUE-VIOLET SCREEN.

Solution of Methylene Blue N, at $\frac{1}{2}$ per cent.	20 c.c.
Water	20 c.c.

ORANGE SCREEN.

Solution of Erythrosine, at $\frac{1}{2}$ per cent.	18 c.c.
Saturated solution of Metanile Yellow at 60deg. Fahr. ...	20 c.c.

The screens should be allowed to remain in the dyes for five minutes at a temperature of 70deg. Fahr., then rinsed and dried carefully. When dry, cement two of each tint together with Canada Balsam and bind the edges with gummed tape. Screens made according to these formulæ form a part of the collection of necessary materials supplied by the makers. Having prepared the screens, the next operation will be to make the necessary exposures, and for this we must use the plates suited as follows:—

With the Green Screen use Lumière Orthochromatic, Series A.

With the Blue Screen use Lumière Extra Rapid, Blue Label.

With the Orange Screen use Lumière Orthochromatic, Series B.

The time of exposure will, of course, be considerably augmented by the use of these screens. Roughly speaking, the exposure required, taking one as that necessary for the blue-violet screen on the extra rapid plate, will be 12 times for each of the other screens, namely, green and orange, used, of course, in conjunction with the plates mentioned. Care must be taken in the development of these plates, as, owing to their peculiar sensitiveness, one is very prone to produce a foggy image unless great care is exercised in the selection of the dark room illuminant. For the Series A plate a very weak red light must be employed, while for Series B and for the Blue Label plate a very faint green light will be found the most reliable. Halation must be carefully avoided, and the plates should be backed with the solution supplied. The character of negative to be aimed at is one containing a full range of gradation and entirely free from the slightest trace of stain or discolouration of any description. Should it be necessary to intensify or reduce the negative, the use of the following solutions will be found most reliable:—

INTENSIFIER.

Anhydrous Sulphite of Soda	10 grammes.
Mercuric Iodide	1 gramme.
Water	250 c.c.

REDUCER.

Peroxide of Cerium (Lumière's Patent) ...	5 grammes
Water	100 c.c.

The next operation is to print the three colour records or monochromes, and for this a sheet of non-stretching baryta paper is mounted on a glass plate, which has been previously edged by a band of solution, composed of

Benzole	1,000 parts.
Masticated Rubber	15 "

and when dry, coated with a collodion, prepared as follows:—

Alcohol	500 parts.
Ether	625 "
Pyroxyline	12.5 "
Castor Oil	3 "

The paper is applied by immersing plate and paper (baryta-coated side in contact with collodioned glass) in a 7 per cent. solution of gelatine at a temperature of about 145deg. Fahr. Excess of gelatine is removed by a squeegee, and the plate put to dry. After drying for 12 hours at an ordinary temperature this prepared support must be coated with ordinary temperature this prepared support must be coated with a sensitive coating composed as follows:—

Water	1,000 parts.
Emulsion Gelatine	120 "
Hard Glue (Coignets)	120 "
Ammonium Bichromate	60 "
25 per cent. solution of Potassium Citrate.....	40 "
Cochineal Red	1 "
Alcohol	200 "

Soak the gelatine and glue in the water for twelve hours, then melt in a water bath at a temperature of 120deg. to 140deg. Fahr. Allow the mixture to cool down to 95deg. Fahr., and then add in order given, while shaking or stirring, the ammonium bichromate, potassium citrate, and the cochineal red. Then little by little add the alcohol, and filter through a fine cloth. Apply a coating of this mixture to the paper mounted on the glass, allowing about 5 c.c. of mixture to a 13 by 18 cm. plate. The plates thus coated must be placed on a levelling slab to set, and then dried in a well-ventilated dark room at a temperature not exceeding 68deg. Fahr. Drying should in no case take longer than 12 hours. After drying, the sensitive papers are stripped from the glass support. They may now be printed, and for this purpose are placed under the negatives as in ordinary carbon printing. The use of an actinometer will be found the best printing guide. Exposure being deemed sufficient, it is now necessary to develop the image. Take the print, together with a plate which has been collodionised as before mentioned, and then coated with a 7.5 solution of masticated rubber in benzole, and immerse both for 15 to 20 seconds in a basin of ice water, bring the two into contact, and squeegee well as in the carbon process. Place under pressure for five or ten minutes before development. To develop, first soak the glass plate bearing the print in cold water for two hours to permit the gelatine to become thoroughly soaked. Then immerse in water at 100deg. Fahr. for half an hour, when the paper support will leave the print. Development is then carried out in the usual manner employed in the carbon process, until all the soluble gelatine has been dissolved, and there remains on the glass only a colourless image of insoluble gelatine in slight relief. This should be washed in cold water and then put for five minutes in alcohol and placed to dry.

When dry, these colourless positives of insoluble gelatine are to be immersed in their respective dyeing baths of red, yellow, and blue. Care

must be taken not to mix up the positives, and they should be marked to avoid error. The positive printed from the negative taken through the green screen is dyed red; that from the negative taken through the violet screen, yellow.

The composition of the dyeing baths is as follows:—

RED BATH.

Water	1,000 parts.
3 per cent. solution of Erythrosine J.	25 „

BLUE BATH.

Water	1,000 parts.
3 per cent. solution of pure Diamine F	50 „
15 per cent. solution of Hard Glue, 70 parts.	

YELLOW BATH.

Water	1,000 parts.
Chrysophenine G	4 „
Dissolve at 160deg. Fahr. and add Alcohol 50 parts.	

Immersion for twelve hours is sufficient at ordinary temperatures.

After dyeing, the prints are briefly washed in cold water to get rid of the excess of colour. The yellow monochrome may be put to dry without further precaution, but the red and blue are preferably immersed in a 5 per cent. solution of sulphate of copper and rinsed before drying. After drying it is advisable to bring the dyed positives into temporary superposition for viewing, which is most easily accomplished by placing two blocks of wood on a sheet of white paper and carefully placing the positives in register, putting the yellow first, then the blue, and lastly the red. By examination from above it can be seen whether any correction of the monochromes is necessary. Notwithstanding all precautions, it is rarely that the representation of the colours is quite perfect. The monochromes may be easily intensified by further immersion in the tinting baths. For instance, if inspection shows that the result is too green, the red needs intensification. The red or yellow images may be easily reduced by merely soaking in water, but the blue will be found to resist hot or cold water, acids or any organic solvent, but the colour may be readily reduced by the employment of a solution of gelatine or glue of about .5 to 1 per cent. in strength. To make these corrections the three monochromes should be clipped together with wooden clips, placing the monochrome needing correction at the bottom with the coloured surface outwards. It is then easy with the aid of a moist brush to reduce the regions which are too highly coloured. With a knowledge of the properties of the colours used, these local corrections may be made on all three images. If the red will not respond to the use of pure water, or great reduction is needed, a 5 per cent. solution of ammonia may be employed, while for increasing the depth a solution of erythrosine is used. The yellow may be reduced generally by soaking or locally with the brush, but cannot be easily intensified, owing to the slowness with which the insoluble gelatine absorbs chrysophenine.

In the case of the blue, the slow absorption and the general resistance of the colour to any solvent renders it much less amenable to after treatment than in the case of the red or yellow. When the effect by superposition is satisfactory, and the red and blue monochromes (if corrected) have been redipped in the solution of copper sulphate and dried, the three surfaces of the prints should be coated with a 1.5 solution of rubber in Benzole, and when this is dry with a 1 per cent. collodion. To finally

place the films in superposition it is necessary to use a temporary paper support, which is coated with the following solution:—

Water	1,000 parts.
Hard Glue	150 „

and applied to the yellow positive. When completely dry the paper is stripped, which brings with it the yellow film, which must be applied to the blue positive, using the following mountant:—

Water	1,000 parts.
Hard Gelatine	120 „
Glycerine	50 „

This solution, while warm, is put in a dish in which is immersed the glass bearing the blue image; the two are then brought into contact and adjusted into perfect register, and any excess of solution removed by squeegeeing. When quite dry the paper is stripped from the glass, bringing with it the blue film on which is imposed the yellow. The operation is repeated by applying this to the glass bearing the red image, using the same solution of gelatine and glycerine. This paper being again stripped when dry, will bear the three films, red, yellow, and blue, in superposition, and it is necessary to transfer these to glass in order that it may be viewed as a transparency. This is best accomplished by the medium of the gelatine and glycerine solution. The first transfer of the yellow film having been made by glue, which is much more soluble than gelatine, it is easy to remove the paper, leaving the completed print adhering to the final support of glass.

RECENT NOVELTIES IN APPARATUS, &c.

BY THE EDITOR.

[These notices are confined as far as possible to apparatus introduced since the publication of the last Almanac. In all cases the various articles have come under our personal examination, a rule from which we allow no departure.]

THE "REX" CAMERA.

(Sold by Hinton and Co., 38, Bedford Street, Strand, W.C.)

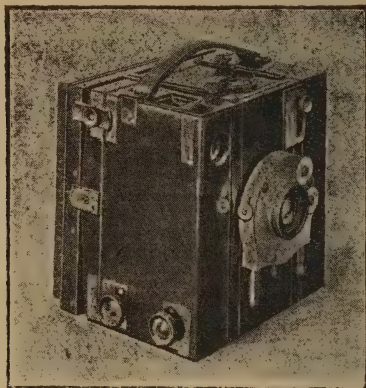


Fig. 1.

Figure 1 shows this camera in its simplest form, as taken out of the case ready at once for hand work. The "Rex" is so built for the lens used, that the lens is in focus for infinity when the camera is completely closed. For nearer distances, focussing may be done by racking out the front milled screw, as seen in above figure, or a focussing flange is fitted if desired; in either case a scale from infinity to 6ft. is provided. A considerable rising front is obtained. The finder is a large one, of the "brilliant" description, and is clearly seen as is the circular spirit level, in the figures. A simple variety of the

"Rex" is built without any extension, as shown in Figs. 2 and 3, and in this case Fig. 1 represents the complete camera, focussing being

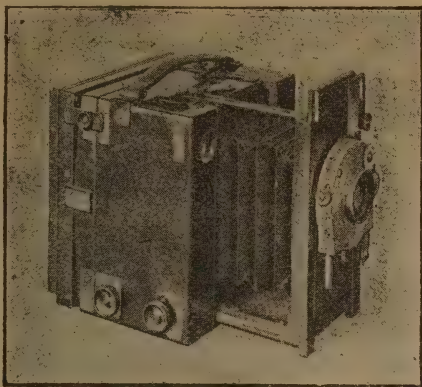


Fig. 2.

done by a scaled focussing flange, from infinity to 6ft., and nearer distances by a series of specially ground "magnifiers," giving focus as near as 18in.; these magnifiers slide on front of lens.

Fig. 2 shows the "Rex" with front fully extended for near work and general stand use. The swing and reversing back are at once available and easily manipulated.

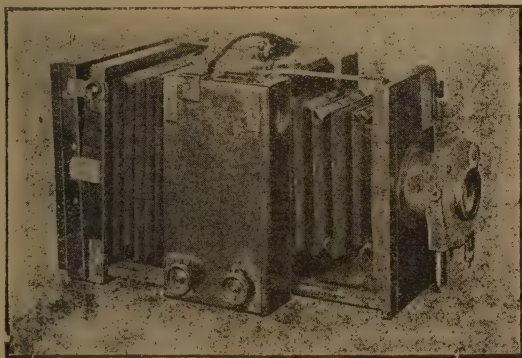


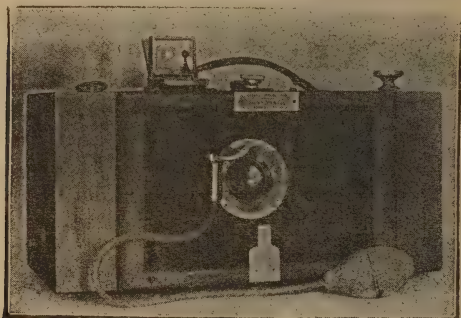
Fig. 3.

Figure 3 represents the "Rex" with both back and front extended, for use with the single combination of the doublet used for hand work.

The special feature of the extended camera is its great stability. This stability is obtained in great measure by the sliding stays shown in the figure. If the long extension is used with the complete lens, copying of subjects to original or life size may be done, thus the "Rex" is suitable for scientific purposes, and for all purposes where a large reproduction of a subject is required.

HINTON'S COMBINED PANORAMIC AND HAND CAMERA.

(Sold by Hinton and Co., 38, Bedford Street, Strand, W.C.)



This apparatus is designed to do the work of both swing lens panoramic cameras, and of the ordinary stationary lens hand camera. By a simple device the roll film is used either curved for the panoramic photos or flat for the ordinary stationary lens work, and the change can be effected for any exposure while the film is in the camera ready for exposure, thus a roll of film may contain exposures mixed at will of panoramic photos, ordinary views, portraits, interiors, etc. The camera will thus do the work of hitherto two distinct types of camera.

A rising front is also fitted, and this can be used in both panoramic and ordinary work.

The sizes of the photographs are 12 by 14in. panoramic, and 6 by 4in. ordinary. The camera has no loose parts; is daylight loading; is fitted with shutter for time and instantaneous exposures; focussing scale for lens from any distance to within 10 to 6ft., finder and level, and bushes for stand, and is quite self-contained.

THE LOTHIAN QUICK-LEVEL TRIPOD HEAD.

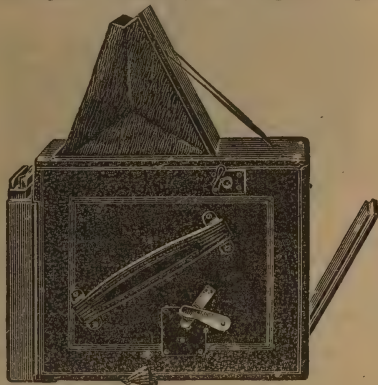
(Andrew H. Baird, 33-9, Lothian Street, Edinburgh.)

This is an adaptation of the principle of the ball and socket joint with which some tripod heads are fitted. That which answers for the cup or socket consists of a shallow turned wood box, which is fastened by a screw or otherwise to the ordinary tripod head. The ball is represented by a metal stamping, which is attached to the camera when in use by slipping its slotted flange under small metal plates screwed on to the camera bottom for the purpose. The camera may be adjusted either to the level or at any angle irrespective of the position of the tripod head, and when in the desired position is fastened by firmly pressing the "cup" into the "ball," just as a bung may be secured in the mouth of a jar.

THE REVERSING BACK "MIRAL" CAMERAS.

Talbot and Eamer, Liverpool.

This camera is constructed of well-seasoned mahogany, covered in fine grain leather; there is a full size finder for both horizontal and vertical pictures. Objects may be focussed and composed right up to the moment of exposure. The ground glass is accurately marked, vertically and horizontally. One inch of rising front is given for both vertical and horizontal pictures, and the amount of rise is shown exactly on the finder. The shutter is behind lens, time and instantaneous, adjustable speeds and speed indicator, with engraved speeds from 1-15th



to 1-100th of a second. The dark slides hold two plates; they are extremely light and compact; $3\frac{1}{4}$ in. wide, $\frac{1}{2}$ in. deep. The parts work with the greatest smoothness, and all the movements, rising front, focussing, and speed adjustment, are instantly effected from the outside of the camera. Dimensions, fitted with a 6 in. lens; $8\frac{1}{2}$ in. by 6 in. by 5 in.

NEW WIZARD CAMERAS.

(Sold by Seabrook Bros. & Co., Edmunds Place, Aldersgate Street, London, E.C.)

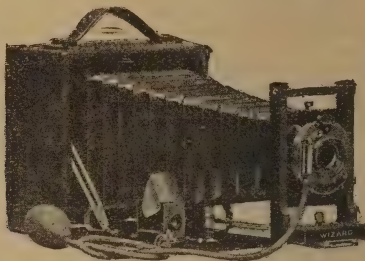
THE WIZARD STEREOSCOPIC CAMERA.



This camera combines all the necessary requirements in an instru-

ment of this kind, being furnished with a swing back and reversible back having special bed for use with the wide angle lens; rack and pinion; reversible brilliant finder, rising, falling, and sliding front, etc. Besides being suitable for a stereoscopic camera, it also makes (when the division of the bellows is detached) a regular half-plate camera.

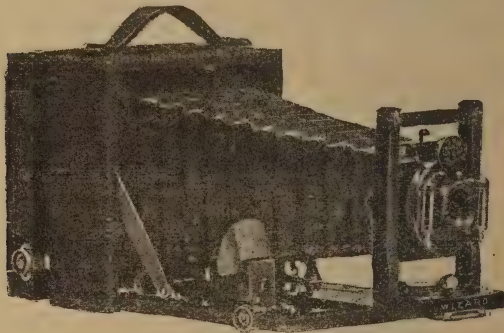
THE NEW WIZARD No. 25.



The advantage of a rack and pinion focussing device and extra long bellows, permitting the use of long focus lenses are two favourable points in the design of this camera. It is thus better equipped than the No. 92 for copying or for work requiring bellows extension. The rear combination of the lens can be used separately for landscapes and distant objects.

The camera is fitted with a reversible back, rising and falling front, special convertible symmetrical lens, together with a shutter of varying speeds.

THE No. 4 LONG FOCUS WIZARD.



This camera has a patent swing back and fitted with an automatic shutter. It is suitable for long focus lenses, and the lens supplied with the camera permits of the use of either combination.

THE POCKET WIZARD.



This camera is suitable for the pocket, and is the smallest of its kind that we have yet seen, being only $3\frac{1}{2}$ in. wide by 5 in. long and $1\frac{1}{4}$ in. thick. It is fitted with a time, bulb, and instantaneous shutter, with a rack and pinion, and triple lens, brilliant finder, sliding front, and other improvements. The lens fitted to this camera is a rapid rectilinear.

THE NEW WIZARD No. 92.



This is fitted with an instantaneous shutter giving various speeds, and has a specially constructed reversible back. It is fitted with a rapid rectilinear lens and a brilliant finder, and is specially intended for beginners.

LONG FOCUS CYCLE S.R. WIZARD.

This camera has a triple telescopic bed. By an ingenious arrangement, the full extension is acquired by merely pulling out the front. This action automatically releases the lock, holding the extra length of bellows in a normal position and relocks it when drawn out without

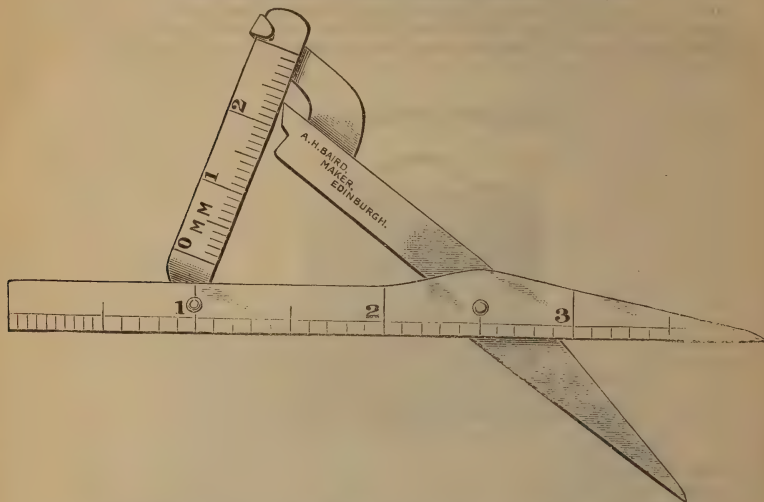
the aid of any set screws. Special attention is given to rigidity, and whilst the extension of the half-plate camera is 20in., and that of 5 by 4



15½in. There is no loss of strength in this model compared with the previous ones.

THE KEW MICROMETER.

(Sold by A. H. Baird, Lothian Street, Edinburgh, N.B.)



All botanists, entomologists, and others who have to deal frequently with the minute measurements of parts of the object they examine, must have felt the inconvenience of the double measurement involved in the use of compasses and a measuring rule. The Kew Micrometer does away with one of these. By a simple adjustment of a scale to one arm of the micrometer, the length of an object is recorded up to a fraction of an inch or millimeter, and can be read off at leisure. For work under the microscope this is an essential advantage, for

a measurement may be recorded and a dissection proceeded with without lifting the eye from the eyepiece of that instrument.

One side of the scale being graduated to inches and fractions, the other to millimeters, the instrument not only gives measurements in both scales, but it also furnishes a ready means of turning the one scale into the other without calculation—a matter of great moment at the present time when two scales are in use in several countries. The instrument is four inches in length, and the long arm is graduated to tenths of inches, and can therefore be used for larger measurements.

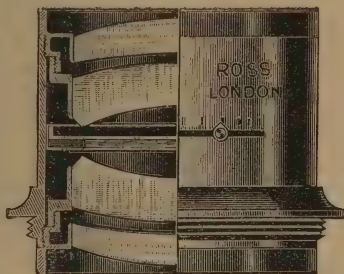
THE LOTHIAN COMBINED FRAME.

(Manufactured by Andrew H. Baird, 33-9, Lothian Street, Edinburgh.)

The combined frame is in construction an ordinary box pattern printing frame, but its front and sides are finished as a picture frame. Thus, looked at from the back, it appears to be a printing frame, but seen from the front there is nothing to indicate that it can be applied to any but the ordinary purpose of a picture frame. Enclosed in the box in which each frame is sent out are a number of backing papers of various tints, and by placing an unmounted finished print in front of a backing of suitable colour in the frame with a plain piece of glass in the place the negative occupies, the whole constitutes a framed picture, and may be hung on the wall or put in any other appropriate place. The frame may also be utilised for storing and keeping flat films or unmounted prints.

THE HOMOCENTRIC LENS.

(Manufactured and sold by Ross Limited, 111, New Bond Street, W., and 31, Cockspur Street, London, S.W.)



Messrs. Ross, Limited, supply the following particulars of this new lens:—"Homocentric" signifies the ideal definition obtained when all rays of light emanating from any one point of the object are converged by a lens again into one point in the image. It is claimed that the new "Homocentric" lens possesses this definition to a degree hitherto unattained, and hence the name given to the lens. In the construction of photographic lens systems generally, a certain residue of secondary spherical aberration cannot be eliminated when a flat field is obtained. This aberration, known as "spherical zones," tends to destroy the fine detail, more especially in the centre of the image, and causes the focus of the lens to vary with the aperture of stop used, imperfections

which are particularly injurious to the quality of the image in enlargements, and in lenses of long focus.

"Homocentric" lenses are free from these spherical zones, and have not the slightest variation in focus whether large or small diaphragms are used; consequently they possess the most exquisite defining power. Enlargements therefore from a negative taken with a "Homocentric" lens are perfect as regards detail and fineness of contrast. "Homocentric" lenses, while being equal to any other anastigmat in flatness of field, freedom from coma and astigmatism, have their colour correction so perfect that the different coloured images are identical in size and position, thus rendering the "Homocentric" lens specially suitable for three colour and process work; in fact, the lens may be termed semi-apochromatic. The "Homocentric" lens is symmetrical, consisting of four single meniscus lenses, the main separation between the combinations being sufficient to allow of the insertion of between-lens shutters.

The back lens of the "Homocentric" may be used with excellent results, when suitable diaphragms are used, as a single long-focus lens. The focus of the single lens is nearly twice that of the double combination.

The "Homocentric" is made in series of different relative apertures, as follows:—

Series "B," with an aperture $f/5.6$, for extremely rapid exposures both in studio and outdoor.

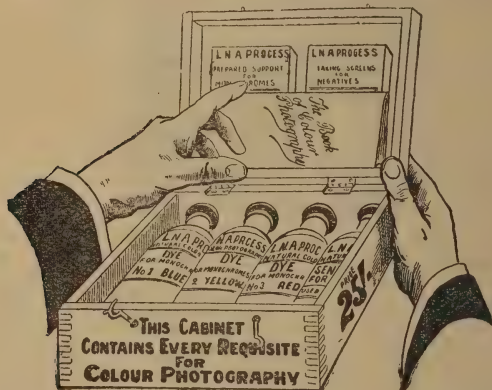
Series "C," with an aperture $f/6.3$, specially for hand camera work, instantaneous views, and groups.

Series "D," with an aperture $f/8$ for landscapes, groups, interiors, and copying.

Series "Da," $f/8$, and Series "Db," $f/10$, for process work, including line, half-tone, and three-colour work.

THE LUMIERE "COLOUR PHOTOGRAPHY" CABINET.

(The Lumiere N. A. Co., Ltd, 4, Bloomsbury Street, W.C.)



This cabinet is designed for those who desire to experiment in colour photography, and contains all the special apparatus and materials re-

quired for the protection of lantern slides in colour by the Lumiere process. The working of the process necessitates the employment of three colour screens or light filters carefully adjusted with regard to tint and depth. Those supplied with the cabinet are of optically worked glass, and a piece of apparatus is included for attaching them to the camera lens. The negatives obtained by camera exposures are printed on specially prepared tissues which require to be sensitised shortly before use. Tissues and sensitizer are provided. The superposition of the tissues after having been developed and dyed by means of the dyes provided for the purpose constitutes the transparency in colours.

OXYLITH AND THE OXYGENERATOR.

(L. Gaumont and Co., 25 and 22, Cecil Court, Charing Cross Road, W.C.)

Oxylith is a substance which has the property of giving off pure oxygen in simple contact with water, the same as carbide of calcium when in contact with water gives off acetylene gas. It is supplied in the shape of small cubes or bricks about $1\frac{1}{2}$ inches square, weighing about $3\frac{1}{2}$ ounces, and each making 13 to 14 quarts or litres of oxygen, packed in sealed tins, $6\frac{1}{2}$ by $1\frac{1}{2}$ by 5 inches in size, containing twelve bricks.

The "Oxygenator" is the special apparatus designed to obtain oxygen from "oxylith." It is made in more than one model to answer different requirements, but the method of working is the same for each. Model No. 1 is made of copper, nickelled and polished. It is intended principally for pharmaceutical and medical uses requiring oxygen which is chemically pure. The maximum capacity of Model No. 1 is ten bricks, producing 140 to 150 quarts of pure oxygen without recharging, but any less charge can be used. Models 2 and 3 are rather stronger, and are more particularly adapted for illuminating purposes for limelight projection, in combination with coal gas, hydrogen, ether, acetylene, etc. The oxygen is generated under sufficient pressure to make it suitable for mixed or blow-through jets, saturators, etc. Models 2 and 3 are made in parts which screw one into the other, and which, when taken to pieces, pack in a very small space. Model No. 2 takes twelve bricks of "oxylith," giving 170 to 180 quarts of oxygen, while the capacity of No. 3 is 22 cakes, which yields about 300 quarts, sufficient to work an ordinary limelight jet for two and a half to three hours.

The recharging can be done very rapidly.

The interior of the well or lower tank contains a metal basket, which rests on ledges projecting from the side. This basket is divided into sections, arranged in a spiral and as steps one above the other. It is in these divisions that the "oxylith" bricks are placed, the well having been previously filled with water up to and not beyond the projecting ledges on which the basket rests, just beneath the level of the bottom of the basket. The other parts of the "oxygenator" are then screwed into position, care being taken to clamp the well cover.

When wanting to use, it is only necessary to pour a little water, say a gallon or so to start, into the feed tank at the top. The effect of this is to raise the level of the water in the well, which immediately attacks the "oxylith," and oxygen is at once generated. It can be left until required, or immediately used by turning the cock to which the

tube from jet is attached. From time to time a little more water is poured into the feed-tank as it empties.

When exhausted the residue is practically pure soda.

THE "PALACE" CAMERAS.

Hyde and Co., 1, Palace Street, Buckingham Palace Road, S.W.

The Palace magazine hand camera is a well-finished instrument of the box form. It is covered with black, long-grained leather, and the outside metal fittings are bronzed, thus it presents an extremely neat appearance. The camera carries twelve quarter plates or films, which are changed automatically by pressing a lever, an indicator registering the number of the plate exposed. In our hands the changing arrangement worked perfectly, and the change of plate we found could be effected very rapidly, enabling a quick succession of plates to be exposed, if required. The lens is a Rapid Rectilinear, working at $f.8$, and has an iris diaphragm, with a scale for the apertures, according to the standard system. The lens is fitted with a focussing jacket, a lever with scale, indicating the distance for which the lens is set. The shutter is "everset," and gives time and instantaneous exposures, the latter ranging from 1-25 to 1-100 of a second. A pneumatic release is also provided. There are two brilliant view finders, and bushes are provided for fixing the camera on a tripod for both vertical and horizontal pictures. The price complete is £2 2s.

The Palace folding hand camera is also an extremely well finished instrument, and is designed either for use as a hand camera or upon a tripod. It possesses every movement that is usual in ordinary stand cameras, and the plates are contained in double dark slides, of which three are provided. The body of the camera is of polished mahogany, the interior being covered with black leather, and the fittings are of polished and lacquered brass. The body of the camera is square and has a reversible back, and a focussing screw is provided. The finder is also reversible, giving a correct image of the view included on the plate, whether used vertically or horizontally. The lens is a Rapid Rectilinear, working at $f.8$, and is fitted with an iris diaphragm and an automatic shutter, with pneumatic release arranged for instantaneous, time, and bulb exposures. The price of the camera, including three double backs, is £2 2s.

ACETYLENE APPARATUS FOR THE LANTERN.

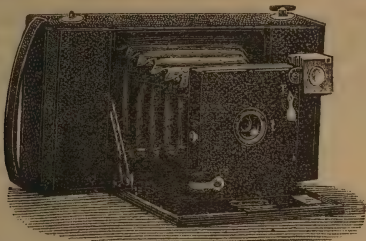
R. J. Moss, 98, Snow Hill, Birmingham.

The Moss combined tray and drawer takes the place of the usual jet tray. It proves a handy receptacle for spare burners, pliers, burner cleaners and other odds and ends which should be kept within easy reach of the lanternist.

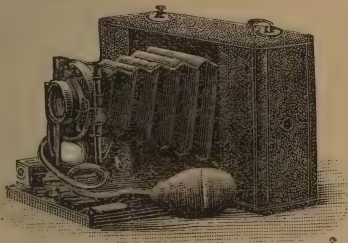
The Moss combined purifier and tray is intended to overcome some of the troubles which the lanternist is liable when using acetylene direct from the generator. The pressure of moisture, sulphuretted or phosphoretted hydrogen, and other impurities beyond the physical action of choking the nipple, undoubtedly decreases the brilliancy of the flame. Although it is not possible to construct a perfect purifier of dimensions sufficiently small to go within a lantern, this instrument acts with considerable efficiency for some hours. The method of recharging is simple, and takes but little time.

THE "FAIRFIELD" CAMERAS.

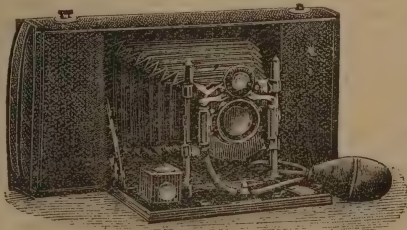
Sold by Hora and Co., 346, York Road, Wandsworth, London, S.W.



The Fairfield No. 1 daylight loading film camera is made to take roll films, and is fitted so that pictures may be taken either $4\frac{1}{2}$ by $3\frac{1}{4}$ or $3\frac{1}{4}$ square. Its general appearance may be seen by the illustration. It has an achromatic lens, with stops, focussing scale, instantaneous shutter with variable speeds, also adjustable for time exposures. The finder is of the brilliant type, and is reversible.



The Fairfield No. 2 daylight loading film camera is similar to the No. 1, but is fitted with a rapid rectilinear lens with iris diaphragm. It has rising and falling front, Bausch and Lomb shutter fitted between the lenses, and giving time, instantaneous, and bulb exposures by pneumatic release. A focussing scale is provided.

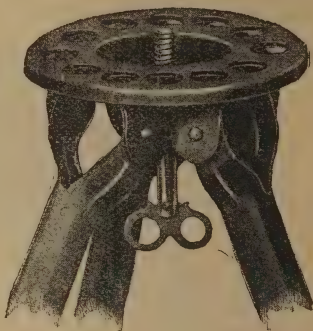


The Fairfield No. 3 daylight loading film camera answers the general description of the No. 2, but in addition to being more highly finished, it is fitted with a Bausch and Lomb Unicum shutter.

THE PERFECTO NICKELLED STEEL TRIPOD.

Manufactured by A. Rosenberg and Co., 21, Southampton Row, Holborn, W.C.

The "Perfecto" Steel Tripod is made of nickelled tempered sheet steel in three telescopic sections, and all hinged joints are rivetted; the legs are triangular in shape, allowing the sections to slide in or out easily, and also giving a large gripping surface for the clamping device, which is one of the principal constructional features, and by means of which each section can be securely clamped to any desired height without



danger of the sections slipping under the weight of a heavy camera. It is also fitted with an adjustable head by which the camera may instantly be clamped in any required position without moving the Tripod legs; this is especially valuable when working on uneven ground, or when pointing the camera upward or downward for photographing high buildings. Weight, 26oz.; length folder, 20½in.; height up to 55½in.

ALLEN'S IDEAL FIELD CAMERA AND SPECIAL DARK SLIDES.

Manufactured by W. Allen, York Road, Maidenhead.

The general design of this camera is of the familiar landscape or tourist form. It has the usual movements and accessories: reversing and double swing back, which can be brought forward for use with wide angle lenses, rising front, rack and pinion for focussing and double extension. The whole plate extends to 21in., the 12in. by 10in. to 30in. Special

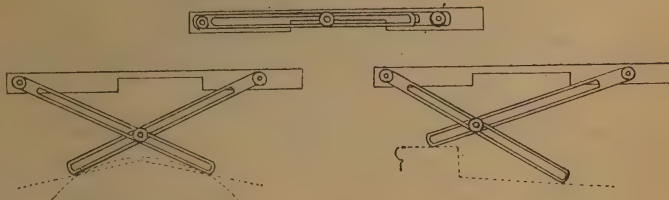
features are the fitting of the front with interchangeable panels, the adjustments for the front, which allow it to be swung either forward or backward, and also to be fixed at any point on the extending base, and the slight taper given to the bellows, which prevents danger of cutting off part of the field on raising the front. The camera is made of well-seasoned mahogany, the base and wearing parts being of the best Spanish. Automatic spring catches are fitted to the slides. The special dark slides are made to fit any camera, and may be either book form or solid. Thoroughly well-seasoned Spanish mahogany is used, and the workmanship is of the best, although the price is low.

THE CAMSTAND.

Wholesale agents : Staley and Co., 35, Aldermanbury, E. C.

This is a piece of apparatus for supporting a camera when used without a stand, and when the available box is not sufficiently flat to support the camera in the required position. It consists, as the illustration shows, of a wooden platform, to each side of which a pair of slotted brass

CLOSED



shuts is affixed: a flat rod terminating at each end with a screw which passes through the slots, by the tightening of the nut, enables the platform to be adjusted either level or at any angle, irrespective of the angle of the base upon which the ends of the slotted bars rest.

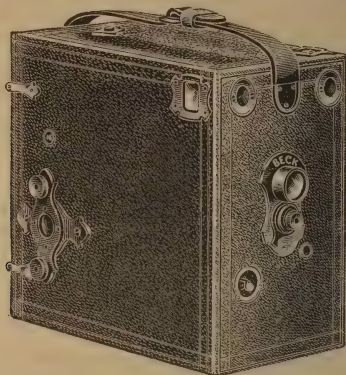
THE FRENA MAX CAMERA.

Manufactured and sold by R. and J. Beck, Limited, 68, Cornhill, E.C.

The Frena Max is a development of the long familiar Frena. The instrument before us takes either forty cut films or twelve glass plates in sheaths. Using the former, the well-known alternate notch system is availed of; so, too, with regard to the plate sheaths. Messrs Beck evidently aim to reduce the use of the hand camera to its utmost simplicity. They very properly remind photographers that in the Frena system three manipulations repeated for each exposure are all that is actually required of the operator: (1) Wind the shutter; (2) expose by setting off the shutter; (3) change the film by turning a handle.

We may enumerate the principal features of the Frena Max: It has two "Cornex" brilliant view finders; a rectilinear lens; four adjustable diaphragms; an automatic counter to register the number of plates used; two tripod sockets; one movement of the handle changes the film and makes ready for the next exposure. The film is changed with the camera in the same position as it is when the photograph is taken. The

instrument measures 8½in. by 9½in. by 4½in., and it is well and strongly made. Upon testing the various movements we find them simple and



reliable. Indeed, nothing could be more effective than the changing system, which is controlled by the lever at the side. One merely pushes it to and fro and *voilà tout*.

THE RAJAR CHANGER FOR FLAT FILMS.

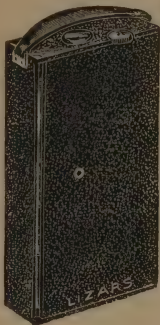
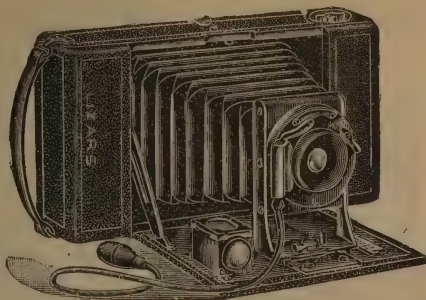
Manufactured by the Brooks-Watson Daylight Camera Co., 81, Tower Buildings, Liverpool.

The "Rajar" Changer is made the same size and shape as the dark slides in ordinary use, and is loaded in daylight with a separate case containing ten flat films, after which it is placed in the camera in the same way as a dark slide. To make the exposure, a sliding part of the Changer is drawn out, and is then pushed back again. These movements have withdrawn one of the films from the tin case and placed it opposite the lens. The exposure is then made in the usual way. After exposure, the sliding part of the Changer is again drawn out and returned, when the exposed film is replaced in the same case. (If required, the Changer may now be removed from the camera, as all the films are protected from light.) The whole of the films can be changed in this manner, when the case containing the exposed films can be taken out and replaced with another tin case of fresh films, all the operations being done in daylight. The whole of these operations are simple to perform. When the whole of the films have been exposed, or should it be required to unload the Changer, the case containing the films is automatically closed, and can be removed in sunlight without any danger of fog. A new case of films can then be substituted and exposed as before. The films are supplied in sealed tin cases ready for loading into the Changer. These cases are light, and occupy the same space as the ordinary envelope in which films are usually sold. The films are packed in the case absolutely naked; there are no separators used, such as cardboard or black paper, which are liable to affect the sensitive surface. During the exposure of the film in the camera it is clamped on all four sides, and thus kept perfectly flat. The Changer can be fitted to any make of camera in which slides are used. For the American type of camera it is specially suitable, being thin enough to be used between the focussing screen and the camera.

THE CHALLENGE DAYSPOOL CAMERAS.

Manufactured by J. Lizars, Glasgow, London, Belfast, Edinburgh, and Aberdeen.

The Dayspool No. 1 is of the folding pocket type, and made in thoroughly seasoned Spanish mahogany, either polished or covered in hard Morocco grained leather. It is instantly opened, and the front pulled out on brass guides, and securely fixed with quick-acting clamping screw. A graduated scale for various distances is fixed to the baseboard. It has rising and falling front; and there are no projections beyond the flush of the camera, to catch on the sides of the pocket. It can be used on a stand. The shutter supplied is the Bausch and Lomb "Unicum," with time and instantaneous movements from 1 to the 100th part



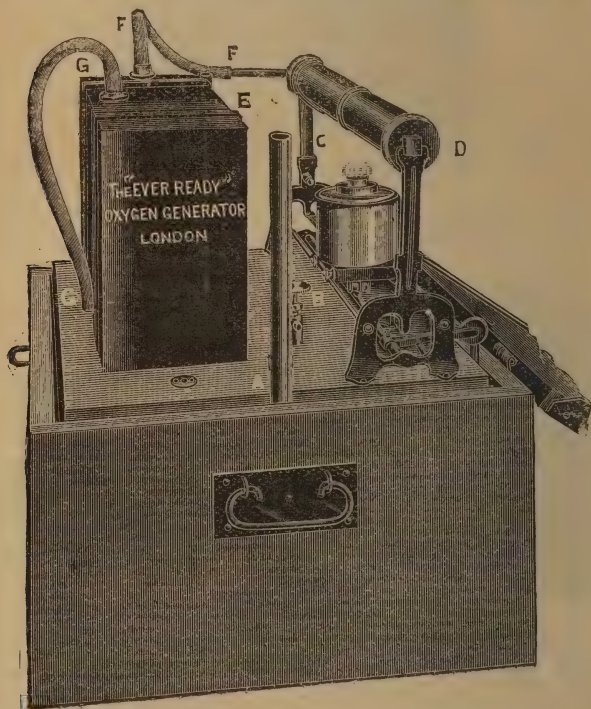
of a second, and released either by ball and tube or finger trigger, both of which are supplied. Being constructed of metal throughout, extreme climatic changes do not affect it. The lenses are carefully selected and tested, and fitted with iris diaphragm. The finder is of the brilliant form, and is reversible for horizontal or vertical pictures. The camera can be used with plates as well as films without any appreciable difference in bulk. Lenses by every maker can be adapted, provided the

focus is not more than 6in. The Challenge Dayspool is identical in every respect to the "Challenge" Dayspool No. 1 previously described, with the exception that it has no rising and falling front, and is adapted for daylight loading films only. The shutter is Bausch and Lomb's "Gem" Automatic, fitted with iris diaphragm, and superior quality achromatic view lens.

THE EVER-READY PORTABLE OXYGEN GENERATOR.

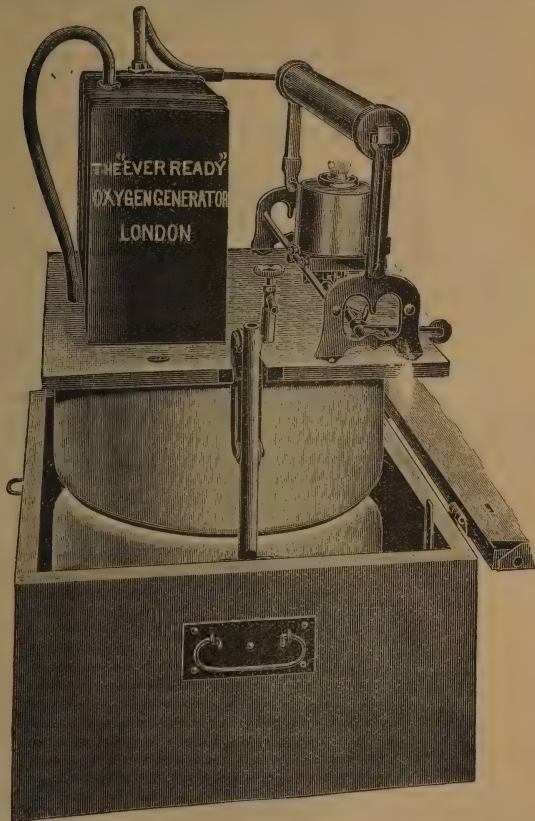
Manufactured by the International Oxy-Generator Syndicate, Limited,
21, Southampton Row, W.C.

This apparatus is quite portable, packing into a travelling case, 22in. by 18in. by 10in. The apparatus itself weighs 35½lbs. It consists of a case which contains a steel tube used as a retort, a spirit lamp for heating the retort, purifying tank for washing and cooling the gas, an automatic travelling stage, a collapsible gas holder for storing the gas,



mould for making the cakes, and all the necessary connections. The charge consists of chlorate of potass and black oxide of manganese.

To use the Apparatus.—Erect the apparatus as shown in illustration No 1. 1st. Lift out the two brass guide tubes A, and fix them in the slots provided at each side of box. 2nd. Draw the travelling stage B to the extreme right of the generator, screw in the lamp, and see that



the latter is supplied with methylated spirit, and the wick well drawn out to obtain a good flame. 3rd. Raise the retort supports C by drawing out spring pins. 4th. Charge retort D, and place it on supports as shown in illustration. 5th. Fill the purifying tank E with water, and connect up the rubber tubes F to F from retort to tank, and G to G from tank to inlet of gas holder.

The illustration No. 1 shows the generator ready for use, and illustration No. 2 shows the gas holder of generator filled.

THE PENNA CAMERAS.

Wallis Bros., Kettering.

The chief difference between this and most other focal plane cameras lies in the blind in the shutter, which has two apertures in it, either of which can be used for taking pictures. The upper or narrow one is used for high speed work only, and can be wound out of the way when not required. The lower or wide aperture is used for slow speed or "time" work only and for focussing. By avoiding the adjustable slit, complicated calculations of speed are dispensed with, and the speeds can be read at a glance at the indicator on the outside of the camera in fractions of a second. By using an aperture larger than the plate very slow automatic speeds can be secured (as low as 1-5th second if desired), and also time exposures can be made easily and simply. If desired the speeds can be made to run from 1-5th to 1-1000th of a second. All adjustments of the shutter are made from the outside, the blind being marked to show which part is being used. The working parts are strong, and nothing fragile projects from the camera. By adding a ball and tube release the camera can be used on a stand without fear of shaking. The thickness of the quarter-plate is folded 2in. (not including the lens). The method of inserting the plate-holders is very convenient, as they finder or sighter with mirror can be fitted.

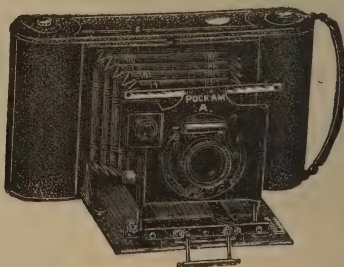
The chief point about the plate-holders is the flexible light trap which allows the aluminium slide to be inserted at any angle without admitting light. The trap consists of a flexible spring covered with velvet, and is very durable, the wear on the pile of the velvet not affecting its efficiency.

The Penna adjustable tripod screw has the merits, that it cannot be screwed too far into the camera, and it will fit a tripod head of any thickness.

TRIBEES CAMERAS.

The Busch Camera Co., 31, Hatton Garden, E.C.

The Pockam model A is a quarter-plate daylight loading camera for



roll films or glass plate. It is of the folding pocket type, the body being made of mahogany and aluminium covered with black grained leather. It folds up to the thickness of a book, and can be carried in the coat pocket. It has all movements, including a rising and sliding front. The front is drawn out and fixed automatically at infinity point, and focussing adjustment is provided. It has a reversible brilliant view finder and a view meter working from the top of lens front, which enables

the operator to see the picture in full. A bush is provided for use of a stand and support when desiring to take vertical pictures. The arrangements for controlling the winding of spool are designed to keep the film perfectly taut. As the block shows, horizontal pictures are taken when the camera is in the normal position. It takes the roll cartridge film $3\frac{1}{4}$ by $4\frac{1}{4}$ pictures, and by means of an adapter with focussing screen and hood and thin metal dark slides, plates of the same size can be used. The size of camera is $7\frac{1}{2}$ by $4\frac{1}{2}$ by $1\frac{1}{2}$, and weighs 22ozs. It is fitted with the Busch achromatic rectilinear "periplanat" lens working at f9. The shutter is the "junior" everset, having T. I. F. and B. movements and iris diaphragm.

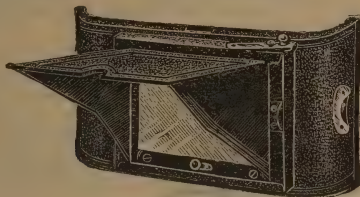
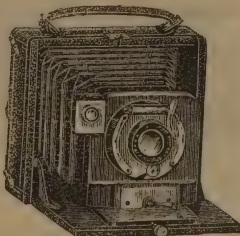


Plate Adapter.

"The Beecam," in consequence of the use of the single metal plate holders, is considerably smaller than the usual quarter-plate patterns. The body is of mahogany, strongly made, with brass fittings. It has rack and pinion focussing adjustment and scale for distances, a reversible



brilliant view finder which requires no shading, and a focussing hood which forms part of the screen. The plate holders are only a trifle thicker than the glass plate itself. Two bushes are provided for use on stand. The lens is the Busch periplanat working at f9. The shutter works between the lenses and gives time, instantaneous and pneumatic movements. An iris diaphragm with scale forms part of the shutter. The camera is supplied with three plate holders complete, in solid leather case with handle. If desired the camera can be supplied with Busch detective apalant, No 2, f6, and the "Unicum" shutter having time movements from 1 to 100th of a second.

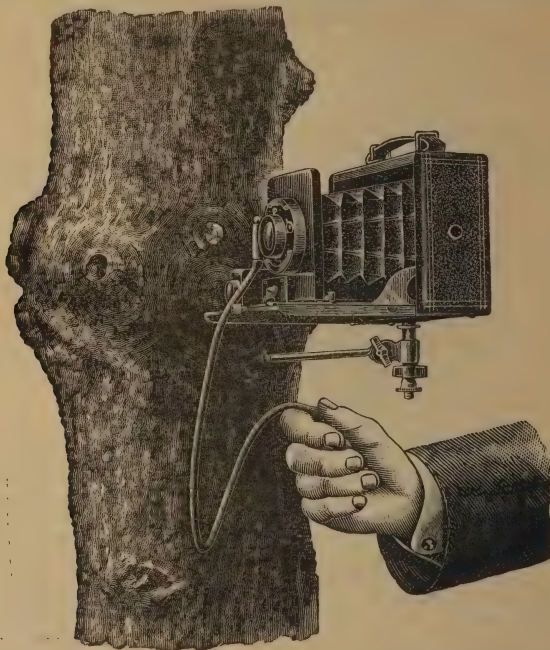
The stereo "Beecam" is of the same style as the "Beecam," and has the same movements and fittings. A pair of Busch periplanat lenses working at

f9 are fitted to the stereoscopic "Everset" metal shutter which has time, instantaneous and pneumatic movements. The focus of the lenses is $5\frac{1}{4}$ in., and they are accurately paired and cover the plate with very good definition at the full aperture f9. There is a very fine rack and pinion focussing adjustment, and the front is quite rigid. The plate holders are of metal a trifle thicker than the glass plate, and take $6\frac{1}{2}$ by $3\frac{1}{4}$ size, and when desired the $3\frac{1}{4}$ by $3\frac{1}{4}$ plate can be used for single pictures. A brilliant finder is fitted to the top of camera front. The camera is supplied with focussing screen and hood and three metal plate holders in solid leather case.

The Tribees field cameras are now supplied with a triple extension enabling the front to be drawn out to 21 in. The back combination of the rapid aplanat can therefore be used alone, giving images double the size of that given with the complete lens.

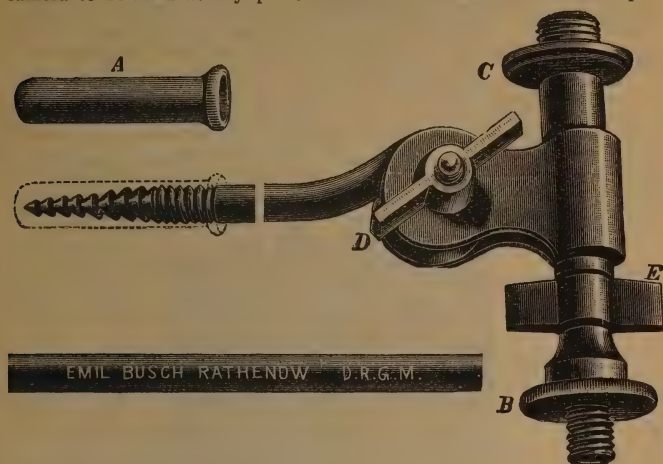
THE BUSCH PATENT POCKET CAMERA STAND.

One end is provided with a screw which can be turned into any wooden foundation, such as the trunk of a tree, a fence, etc. At the opposite end are provided screws of both English and Continental sizes,



which can be screwed into the bush fitted in the camera body. A hinged portion, which is adjusted by a thumb screw D, enables the

camera to be fixed at any point between a vertical and horizontal posi-

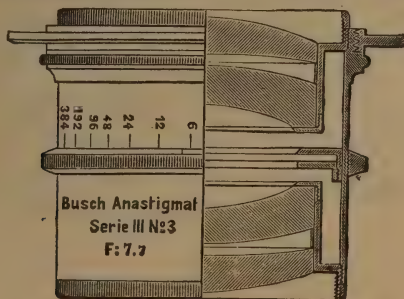


tion, and the thumb screw E clamps the screw after it is fixed into the camera to prevent it turning.

THE BUSCH ANASTIGMATIC LENSES.

Wholesale Agent: Henry F. Purser, 31, Hatton Garden, E.C.

The Busch anastigmat is composed of two symmetrical combinations, each being corrected for both spherical and chromatic aberrations and astigmatism eliminated. The extreme angle of the lens is 80 degrees, and over this angle curvature of the field is entirely absent. Consequent on the symmetrical construction there is an absolute freedom from distortion and a perfectly rectilinear image is produced. Each combination



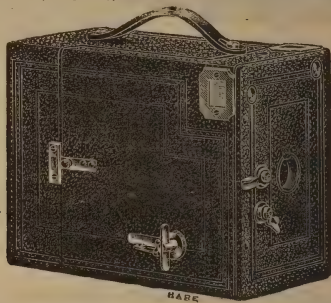
being fully corrected, the back lens can be used alone for landscape and portraiture, the focal strength being about $1\frac{1}{2}$ times that of the complete

lens. In the manufacture of these lenses normal glasses only are employed, having the advantage of being practically free from those defects characteristic of some of the new abnormal glasses, which have a yellowish colour, contain bubbles, etc., and are liable to deterioration by the action of light and atmosphere.

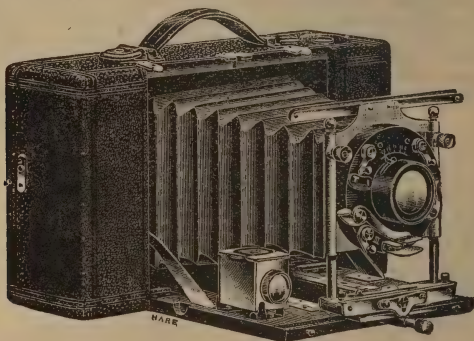
THE SCOUT AND ENSIGN CAMERAS.

Sold by George Houghton and Sons, 88 and 89, High Holborn, London, W.C.

The general characteristics of these instruments will be apparent from the illustrations:—The No. 2 Scout is on the lines of the Scout No. 1, but takes a picture $3\frac{1}{4}$ by $2\frac{1}{4}$, and is fitted with two view-finders and



three stops. Either six or twelve exposure films can be used in this camera. The Ensign, Model B, is similar in appearance to the Model A Ensign, but has the advantage of a rising and folding front for both horizontal and vertical pictures. Messrs. Houghton are supplying it



fitted with Goerz, Cooke, Dallmeyer, Stigmatic, Beck-Steinheil, and other lenses. A plate-adaptor can be supplied, thus enabling the owner to use glass plates whenever desired. The Ensign, Model C, is another form of folding camera, taking pictures on films 5 by 4 size, or on plates $4\frac{1}{4}$ by $3\frac{1}{4}$. The camera is fitted with rising front, R.R. lens, rack and pinion, brilliant finder, and shutter working between the lenses.

A DEVELOPING TIN FOR GUM BICHROMATE PRINTS.

Sold by J. R. Gotz, 215, Shaftesbury Avenue, W.C.

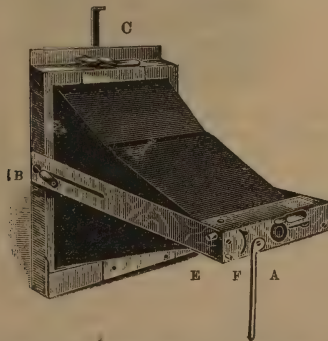
In the instructions for "chromatype," a gum bichromate paper obtainable of Mr. Gotz, that gentleman thus briefly outlines the process of "development":—"The developing operation is carried on over a deep galvanised iron pan or tank, about twice as large as the size of the prints. A gas burner or spirit lamp serves to keep the water at the desired temperature. This should be, at the beginning of the operation, for black and red 95 deg. to 105 deg. F., and for sepia 110 deg. to 115 deg. It may be increased, according to exposure and result desired, for black to 120 deg. and for sepia to 140 deg. F. A proportionate quantity of fine sawdust is put into the hot water and stirred up for operating on the print. This is to assist the hot water in attacking the soluble parts of the pigment. The developing bath must not be sensibly thickened through the addition of the sawdust. The print is placed on a slab—metal, wood, or glass. This is fixed on the edge of the tank, and the hot water poured over it by means of a jar, teacup, or jug. The development should last until the high lights are well out."

THE FOLDING POCKET CYKO CAMERA No. 1.

Sold by John J. Griffin and Sons, Limited, 20-26, Sardinia Street, Lincoln's Inn Fields London, W.C.

With the exception of the bellows, which is of morocco leather, this neat and ingenious pocket camera is made of aluminium. It weighs under 8 oz., and when closed up is only three-quarters of an inch thick, so that it is comfortably stowed in a side pocket. Plates of the size $3\frac{1}{2}$ by $2\frac{1}{2}$ are used. Messrs. Griffin send us the following interesting item of intelligence with reference to testing the camera:

"We would take this opportunity to point out a fact which many of your readers may not be aware of, i.e., that every Cyko Camera sold by us is carefully tested, and the resulting negative is presented with the camera to the purchaser, who has thus indisputable evidence that the camera is accurate and in good working order."



The camera takes double slides; it has two finders: a movable diaphragm plate and a lever movement controlling the exposure. A little pamphlet is

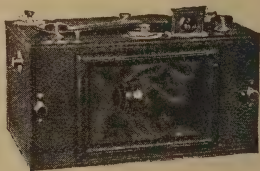
issued which describes the mode of using the camera, from which we take a few extracts:—

Filling the slides: The plates or films are placed film outwards in the bottom groove of the slide and pushed down against the spring; the top of the plate can then be made to engage in the catches. Inserting slide in camera: To open the back press spring C, then insert slide under the grooves and press into place a safety catch. The shutter can then be wholly withdrawn, placed flat on the slide, and the back closed again. All is then ready for photographing. Making the exposure: The position of the object must be carefully centred in the view-finder. Set the shutter by pushing the catch running in the slot at front of camera. Then, holding the instrument firmly, button E must be pressed. This releases the shutter for instantaneous exposure. For time exposure: The camera must be used on a stand or other solid support, and when all is ready, button F must be carefully pressed, when the shutter will open and remain so until pressure on button E closes it. To close camera: After the exposure has been made, the two spring catches B should be pressed down free from the pins and the instrument slowly closed, the catch A holding all in position.

THE AL VISTA PANORAMIC CAMERA.

Agents: George Houghton and Son, 88 and 89, High Holborn, London, W.C.

Messrs. Houghton inform us that they are introducing a form of the Al Vista Panoramic Camera which takes 4 in. spools, and either half or full length pictures, viz., 5 by 4 or 10 by 4 inches. The shutter has three speeds and a lens of the rectilinear type is employed. Al Vista mounts, printing frames, &c., are also supplied. The camera retails at £3 3s. A description of the essential features of the Al Vista camera has not hitherto appeared in the JOURNAL, and is here appended, premising that the original type of instrument is referred to:—



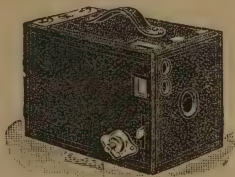
The camera is made in two principal parts: first, the lens board, or front, and lens-moving mechanism; and second, the back or box for holding the film, film spools, film punching and registering device, lens index, stop arm, finder, and level. This construction enables the operator at will to take a picture of a uniform width of 4 in. to 4 in., 6 in., 8 in., 10 in., or 12 in. long. The lens supplants the ordinary focal plane shutter by itself, rotating over a half-circle, and throwing the image 4 in. wide by 12 in. long upon the semi-circular film in the rear. It is pivoted rigidly midway between the front and rear lenses to a vertical shaft operated by clockwork mechanism in a casing below the lens, and is protected by a flexible leather front. A radial rectangular tube about 2 in. long projects rearward from the lens tube. To settle the lens, a key underneath is rotated, which in turn winds up the clock spring and turns the lens in the opposite direction until it is held by the release lever. At the rear of the lens tube is a small shutter whose projecting arm at the top is arranged

to impinge against the stop-plate arm. This has an index pointer on the outside and can be quickly adjusted by rotating the knob with fingers. If an exposure 6 in. long is desired, the pointer is set at figure 6; when the lens is released, it rotates until the arm of the shutter strikes the stop arm and thus only exposes a 6-in. section of the whole film. The finder is supported upon a revolvable plate, also having an index pointer, and this is set at the figure 6, so that the image viewed in it will be parallel to that covered by the lens. Adjacent to the finder is a circular level. A shaft from the clockwork mechanism projects slightly through the bottom of the lens board, or front, and to this may be attached different sized flat pieces of metals, which act as fans and regulate the different speeds at which the lens can be made to rotate. There is also provision made for inserting different sized stops in the lens. The sensitised film spool is put in the extensible spool-holder on the left, and carried over a guide roller, and on through the semi-circular channel to the other end, where it is wound up upon the winding spool, against a suitable tension plate. The thumb screw-head for operating this spool is seen on the right hand end. In its movement the film also operates an index cylinder, which tells at the top the number of inches of film reeled off, then on the left is a punch button for punching a hole through the film after each exposure, as a guide to the separation of the pictures. The lens front is secured to the film box by two thumb-screws, one at each end. In an exposure the lens rotates from one side to the other in $1\frac{1}{2}$ seconds, causing the image to travel over a space of 12 inches, thereby giving 1-6 of a second stationary exposure. Fans lengthen the exposure, $\frac{1}{4}$, $1\text{-}\frac{3}{8}$, $\frac{3}{8}$, $\frac{1}{2}$ seconds, according to size used.

THE No. 2 BROWNIE KODAK.

Manufactured and sold by Kodak, Limited, 43, Clerkenwell Road, E.C.

This Kodak takes pictures $3\frac{1}{4}$ by $2\frac{1}{4}$ inches upon cartridge film. The size of the camera is $5\frac{1}{2}$ inches long, $3\frac{1}{4}$ inches broad, and 4 inches deep; it weighs 13 ounces, and the length of focus of the lens is $4\frac{3}{8}$ inches. The instrument is covered with a fine grain leather cloth, and has nickel-plated fittings. Two finders are provided—one for vertical and one for horizontal pictures, and there is a set of three stops. The shutter is of the everest

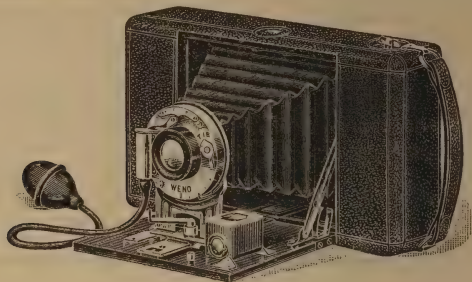


rotary type, the exposure lever being pressed to the right or left. For time exposures the photographer simply has to pull out a second lever, and the exposing lever is then actuated as if making instantaneous exposures. The stops are regulated from the outside of the camera by a sliding rod, which shows by its position which stop is in front of the lens. The spooling system is simple and easily managed by those for whom the No. 2 Brownie is intended.

TWO AMERICAN CAMERAS.

Agents: A. E. Staley and Co., 35, Aldermanbury, London, E.C.

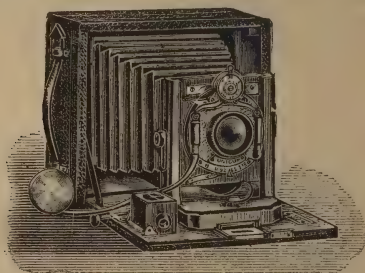
1. The No. 4 Folding Weno Hawkeye.—This Camera takes 5 by 4 rollable film, and has a Bausch & Lomb Unicum shutter, giving exposures from "time" to 1-100th of a second, attached to an F8 lens of the doublet form. On the baseboard are a focussing scale and a movable finder for "upright" and "square" photographs. A spring catch in the back of the camera actuates a disc, which shows the number of films that have



The No. 4 Folding Weno Hawkeye.

been exposed. Measuring something like 9 in. by 5 in. by 2 in., the camera is light, beautifully made and finished, and, of its kind, simple to use.

2. The Ray No. 9.—This quarter-plate instrument takes dark slides, and has a focussing screen. It extends to about 10 in., and the front allows



The Ray No. 9.

the lens plane to be either raised or depressed. On the baseboard a level, a finder, and a focussing scale are placed; and the lens is a doublet controlled by the almost ubiquitous Bausch & Lomb shutter. It is on the whole a pretty and well-made little camera, which can be used on a stand by serious workers.

THE WATKINS DAYLIGHT ENLARGING TEST BOX.

Sold by the Watkins Meter Company, Imperial Mills, Hereford.

Some of the uses of this little instrument are described in the explanatory pamphlet of instructions which is issued with it. That pamphlet points out that, when enlarging from different negatives at different times with the same paper, lens stop, and degree of enlargement (distance of lens from paper) there will be only two varying factors, namely, the activity of the light and the density or thinness of the negative. The test box here illustrated accurately allows for these by a single test, which only occupies a short time. The test is made by the indoor meter held in the box at a fixed distance from the negative, which is placed over the square opening. The box is held in the same position and pointed in the same direction as the enlarging camera will be.



The instructions for using the test box are:—Prepare all the enlarging appliances, and the bromide paper ready placed in position. Place the negative (face down) over the aperture of test box, so that an average amount of sky (about one-third of the aperture) or high light appears. Take the box to the position where enlarging exposure is to be made, and point in direction of sky. Turn the lower flap up to yellow window, and with right finger and thumb turn the lower part of indoor meter to expose a fresh surface of sensitive paper. Allow flap to fall back to its place by means of the spring and at once begin to count seconds. The time to note for the test is when the paper *begins* to darken to a very faint visible tint. The little half-circle of pale buff tint (the same colour as the undarkened paper) is a guide to observe the first darkening beyond this fixed tint. The meter can be turned up to the yellow window for observation at intervals, but counting must cease when this is done, to be resumed at the same number as it is turned down again.

The test box is also applicable to lantern slide reduction. The instructions give various methods of calculating out the exposures that have been ascertained in the test box, which is a piece of apparatus obviously capable of simplifying, by making less empirical, the work of enlarging from negatives of varying qualities.

THE AUTOMAN HAND CAMERAS.

Manufactured by the Thornton-Pickard Manufacturing Company, Altrincham.

One vital characteristic of the Automan series of hand cameras makes for the sympathetic notice of that large class of workers whom it is the foolish fashion to style "snapshotters." The pressure of the finger on the

top of the camera opens and sets it firmly in position at a definite focal length. Thus the Automan cameras may justly be described as of the



Fig. 1.—The Oxford Automan closed.

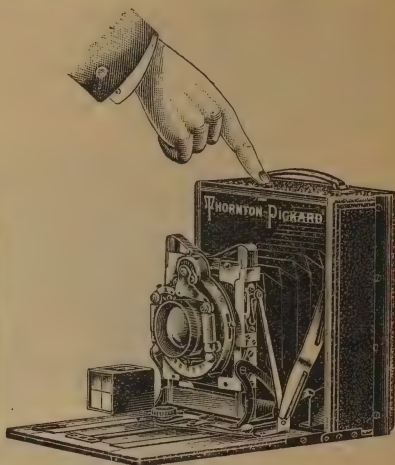


Fig. 2.—The Oxford Automan open.

ever-ready type. They open, as it is said, like a "Jack-in-the-box," and they are closed in just as simple a fashion, namely, by slight pressure on

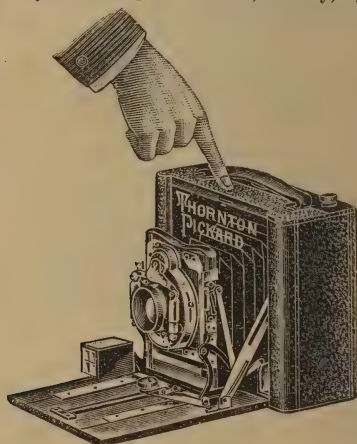


Fig. 3.—The Roll Film Antoman Open.

a side stay. The Oxford Automan takes holders for plates or cut films, has a spring groundglass focussing screen, and is fitted with an "iris" shutter between the lens combinations, giving exposures from time down

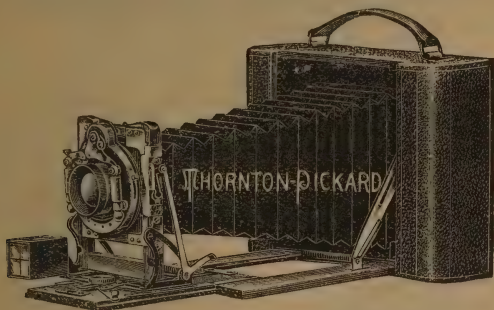


Fig. 4.—The Long Extension Automan.

to the 50th of a second. The camera also has a rising front, double extension, and a lever focussing arrangement.

Yet a second camera takes rollable film, the method of inserting, unwinding, and rewinding the spool being very simple in action. It is made

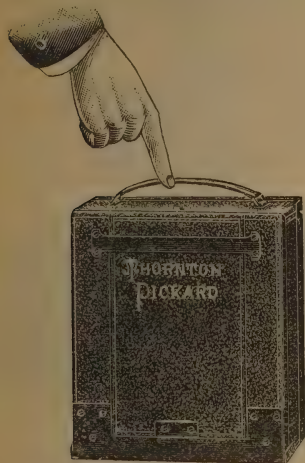


Fig. 5.—The Focal Plane Automan closed.

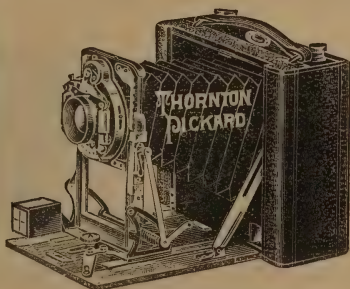


Fig. 6.—The Focal Plane Automan open.

in 4-plate size only, and can also be fitted with adaptors to take glass plates or cut films in holders. It possesses the features, already

enumerated, of the Oxford Automan, with the added advantage, as shown in the fourth illustration, of long extension.

The Focal Plane Automan is made in $\frac{1}{4}$ -plate size only. As the illustration show, it presents the appearance and features of its congeners, but is distinctive as regards the shutter, which has an adjustable slit opened



Fig. 7.—The Focal Plane Shutter with Adjustable Slit.

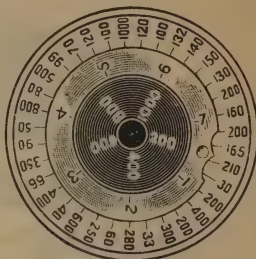


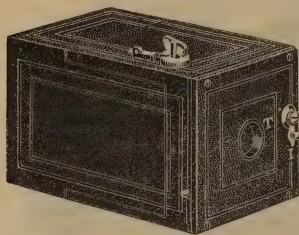
Fig. 8.—The Speed Calculator.

and closed from the outside. A speed calculator affixed to the side of the instrument enables the photographer by the simplest possible arithmetical sum to know precisely what exposure he is giving. There is an available range of speed from 1-30th to 1-100th of a second.

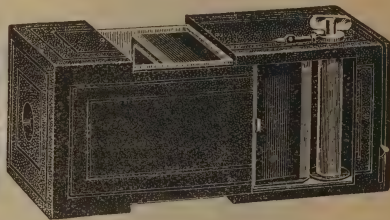
THE No. 1 SCOUT DAYLIGHT ROLL FILM HAND CAMERA.

Sold by George Houghton and Sons, 88 and 89, High Holborn, W.C.

Retailing at 5s., the No. 1 Scout takes a photograph $2\frac{1}{2}$ in. square. The instrument weighs about 9oz., and measures $5\frac{1}{2}$ in. by $3\frac{1}{2}$ in. by $3\frac{1}{2}$ in., so



Showing "No. 1 Scout" closed ready for use.



Showing "No. 1 Scout" partly opened for inserting Spool, &c.

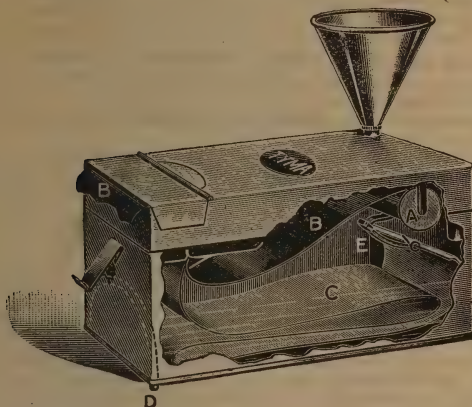
that it is both light and compact. It is covered in waterproof cloth, and has nickel-plated fittings. The "Everset" shutter allows of either time or instantaneous exposures, and the number of the film to be exposed is seen through a posterior ruby disc.

THE "TYMA" DEVELOPING TROUGH.

Sold by George Houghton and Son, 88 and 89, High Holborn, London, W.C.

By the aid of this cleverly-designed piece of apparatus, a roll of exposed celluloid may be inserted in a light, tight receptacle the black paper removed, the film subjected to the action of the developing solution, and the finished negative fixed and washed without the necessity of using a dark-room. The sectional illustration shows the system in actual operation. We append the full working instructions for the use of the "Tyma":—

Take off the lid and put sufficient water in the trough to come just below the top inside curve of the syphon tube, and place the exposed spool in the spring holders so that when unwound the black paper is



- A. Spool in position.
- B. Black paper.
- C. Film.
- D. Syphon outlet.
- E. Rubber spring and clip.

nearest the lid. The bowed wire spring should press lightly against the spool to prevent its unwinding when released from the fingers. Then pass the end of the black paper through the slot to the outside of the lid; pull gently until the end of the film appears, care being taken not to expose too much, or the first picture will be affected. Bend back the rubber spring clip, and attach to end of film, put the lid on, and the film is ready to be lowered into the water, which is done by gently pulling the paper through the slot until the second white figure appears. Then stop for about a minute to allow the film to soak, but do not rock the trough. When the minute has elapsed, continue pulling the black paper gently till just after the figure 1 appears, when a slight resistance will be felt; then pull a little harder, till about a quarter-inch more comes through. The black paper, the end of the film, and the tissue paper that holds film and paper together will now be jammed tightly into the slot and held there, the position of the film being as shown in the block.

The paper can now be torn off flush, and the flap clasped down to the trough, which should be taken in both hands, with one finger on the syphon outlet at the bottom, and well rocked, first lengthways and then breadthways, for about two minutes. The water can then be syphoned off by slightly tilting towards the syphon end till all has run off. Immediately the last drop of water has run off, developing is started without delay by pouring into the trough through the funnel about the same quantity of the following developing solution as there was water for soaking the film:—

DEVELOPING FORMULA.

Metol	...	...	...	...	50 grains.
Hydroquinone	...	...	...	...	40 grains.
Sul. Soda	...	...	...	...	500 grains.
Bro. Pot.	...	...	...	...	25 grains.
Carbonate Soda	...	...	...	...	500 grains.
Water (boiled) to	...	...	...	...	20 ounces.

To obtain the best results use at a temperature of about 60deg. F.

This developer can be used a number of times, allowing each time a little longer for development.

If the exposure is about correct, eight to twelve minutes will be about the time to bring up all detail.

Great care should be taken that the developer is poured in as quickly as possible after the water is poured off. Immediately the developer is in, rock briskly for a minute or two, first lengthways, then breadthways. This is the only means of keeping an even flow of developer between the layers of the film, and if not done, developing will be uneven. Rocking must be continued the whole time, but after the first two or three minutes it need not be quite so brisk, but keep the solution gently flowing both ways continually. When development is complete, the developer can be syphoned back into the bottle and can be used for another occasion. Washing is done by letting the water from a tap run into the funnel for five minutes, and the film will be washed automatically. To Fix.—The lid can be lifted off for a moment in order to pour in the fixing solution, or it can be poured through the funnel as before, and rocked for five minutes. The lid can be taken off to see if all the white surface has gone. When this stage is reached the film is ready for final washing, which is done by letting the water from the tap run into the funnel, which will take away any traces of hypo, both from film and trough.

THE No. 3 ENSIGN HAND CAMERA.

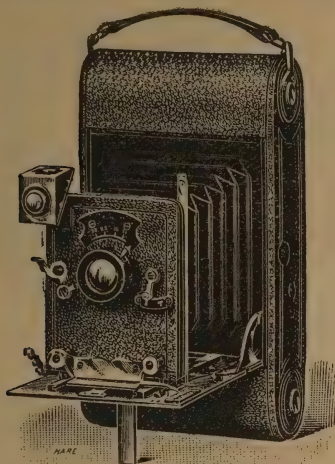
Sold by George Houghton and Son, 88 and 89, High Holborn, London, W.C.

By means of an easily-applied attachment carrying a detachable focusing screen, this camera, which is primarily of the roll-film type, can be converted into a plate camera taking thin metal single slides. The instrument "is of the folding pattern, with falling baseboard and extending front. An infinity catch—adjustable for either plates or films—automatically fixes the front, when drawn out, at the correct focus for distance."

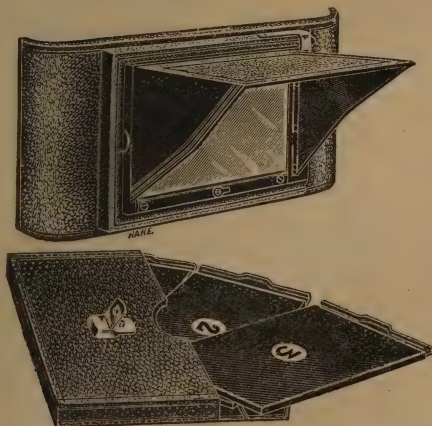
The official specification of the camera is as follows:—

"Camera.—Constructed of mahogany, polished inside, red leather bellows, folding aluminium baseboard, covered outside in seal grain leather; nickel fittings. Lens.—Rapid rectilinear, with iris diaphragms. Shutter—'Everset' type, working between the lenses, giving either time or instantaneous exposures. Finder.—Reversible, ground glass or brilliant form, showing the image the correct way up; fitted with revolving mask.

which gives vertical or horizontal pictures. A direct vision view-finder, with sighter, is also provided, which folds up on the front of the camera. Focussing scale, indicating the various distances at which objects are in



Showing Camera Open for Use.



Showing Plate Attachment and Slides.

focus up to within $1\frac{1}{2}$ yards. Size.—Taking pictures $4\frac{1}{4}$ in. by $3\frac{1}{4}$ in., the camera measures, when closed, 8 in. by $4\frac{1}{2}$ in. by $1\frac{3}{4}$ in."

THE "F.O.P." CAMERA.

Manufactured and sold by R. and J. Beck, 68, Cornhill, E.C.

"F.O.P." stands for "films or plates." Forty of the former, notched, but packed flat "like a pack of cards," or ten of the latter in notched sheaths, are placed in the magazine, and on exposure are removed, one by one, into the receiving chamber by the Frena changing system of alternate notches and teeth. The camera retails at a guinea, has two finders, an achromatic single lens, and an adjustable shutter. The size of film used is $3\frac{1}{2}$ in. by $2\frac{3}{8}$ in., the actual dimensions of the image obtained being $3\frac{1}{2}$ in. by $2\frac{3}{8}$ in. There is no focussing adjustment to the camera, but Frena magnifiers can be supplied to bring objects as near as 3ft. into

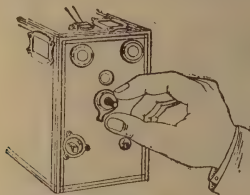


Fig. 1.

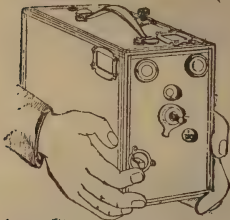


Fig. 2.

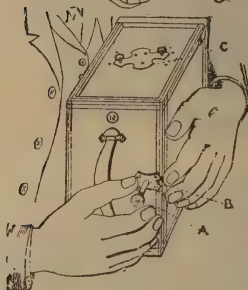


Fig. 3.

focus. To change a film or plate the camera is held with its lens end pointing downwards; a knob on the top of the camera is pulled out, which draws a tray into position underneath the pack of films or plates, and, turning a lever at the back of the camera, drops the foremost film into the tray, leaving another ready for exposure. Upon returning the knob to its original position, the storing tray is slid back,

and the camera is ready for the next exposure. The general manipulation of the camera is shown in the accompanying block. Fig. 1 repre-

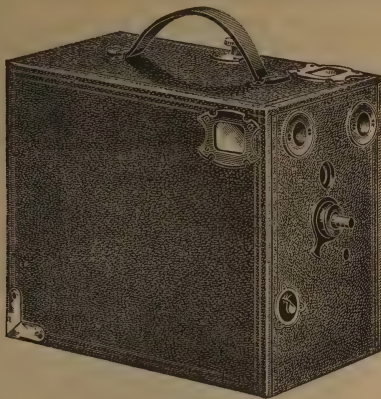


Fig. 4

sents the shutter being wound, Fig. 2 the exposure being made, and Fig. 3 the process of film-changing. Fig. 4 shows a general view of the instrument.

THE APTUS SUPPLEMENTARY LENSES.

Manufactured by Sharp and Hitchmough, Dale Street, Liverpool.

These lenses are made in various sizes to fit the hoods of rapid rectilinear lenses from 1½ in. to 2 in. in diameter. There are three series. The Tele-photo series, as the name indicates, is to increase the size of the image of distant objects, or practically to lengthen the focus of the lens. In using the attachment the enlargement of the object is about one-third. The Wide-angle series perform precisely the opposite function; the original focus of the lens is shortened, and a greater amount of view is included, so that a lens of ordinary angle is rendered available for such work as photographing interiors. The Portrait series is intended



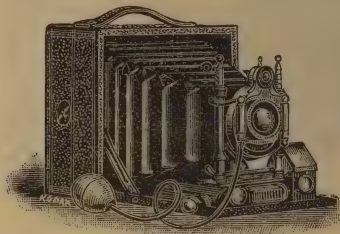
for use when the extension of the camera bellows is not enough to enable, say a head and shoulders, to be obtained at a given distance from the sitter. It is not to be supposed, of course, that the use of supplementary lenses of any kind can entirely supersede instruments of precision, but the Aptus supplementary lenses are undoubtedly as efficient a substitute as can be devised, and to those who are not fortunate enough to have deep pockets they will prove an inexpensive and very useful addition to the photographic kit.

THE GLASS-PLATE KODAK.

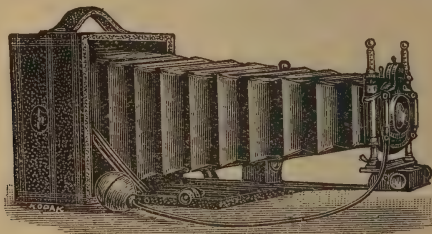
Manufactured and sold by Kodak, Limited, 43, Clerkenwell Road, London, W.C.

The essential feature of this Kodak is that the hooded focussing-screen at the back of the instrument may be easily removed, and a double dark slide containing plates inserted in the focal plane. Thus, for the first time, we believe, a Kodak plate camera, pure and simple, is placed in the hands of photographers. The following specification of particulars will be of interest:—

“The mahogany used in the manufacture of the bodies is water-proofed by a special treatment, which prevents shrinking or swelling,



and makes the cameras specially suitable for the tropics. The cameras are suitable for hand or stand use, and are constructed with bodies of waterproofed mahogany and aluminium covered with fine-grain leather. The cameras are made in two styles, C and D, the difference between the two styles being only in the extension of the bellows. The extension of the D style permits of the use of either front or back combination of the lens separately, and objects down to 16in. from the lens may be focussed. Both styles are fitted with Bausch & Lomb rapid rectilinear



lenses; Bausch & Lomb Unicum shutters; reversible spring backs, removed and readjusted with one hand; ground-glass screen, with folding spring shade for focussing, operated with one hand; rising, falling, and sliding fronts, with automatic locking device; double swing from centre; rack and pinion focussing; socket for tripod screw; brilliant reversible finder; spirit-level; non-sagging bellows. The cameras are sold complete with lens, shutter and one double plate-holder, at the following prices:—No. 3 (4½in. by 3½in.), Model C (long extension), £5; No. 3 (4½in. by

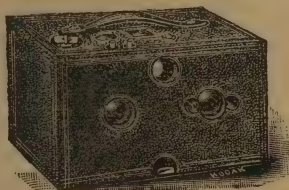
3½in.), Model D (extra long extension), £5 10s.; No. 4 (5in. by 4in.), Model D (extra long extension), £6."

The quarter-plate camera before us weighs about 3lb., and measures, when closed, 5½in. by 3½in. by 3½in. The double extension gives a focal length of 12in. (approx.), and the doublet lens, of 5in. focus (approx.), is controlled by shutter moving at speeds graduated from ¼ to 1-100 of a second. The finder, focussing scale, and spirit are placed close together on the left of the baseboard.

The No. 2 STEREO-KODAK.

Manufactured and sold by Kodak, Limited, 43, Clerkenwell Road, London, E.C.

We have examined the No. 2 Stereo-Kodak with more than ordinary interest. When the sliding catch shown at the bottom of the camera is pulled out, the body of the machine is lifted from its shell by means of the top strap. The film is then spooled into position over guide rollers in the usual way, and when the paper is made taut by the slotted receiving-reel, the cardboard flap (which has two circular holes in it) is folded back to the paper, and the body of the camera returned to its outer case. The two holes at the back of the camera show when Nos. 1 and 2 films are axial to their respective lenses and ready for exposure. The No. 2 Stereo-Kodak, it will have been divined, is of the ever-ready box form. There is a large centrally-placed finder, and the diaphragmed



shutters work between doublet lenses, time and instantaneous exposures being given by applying pressure to protruding pins on the top of the camera, which also carries a spirit-level, an essential adjunct in stereoscopic hand-camera work. A moving metal panel can be used to cover the lens on the left-hand side of the instrument, which thus becomes, at the will of the operator, either a stereoscopic camera taking two 3½in. by 3½in. stereographs, or a monocular camera yielding single 3½in. photographs. The centres of the lenses are set 3½in. apart, and the foci of them are approximately 5in.

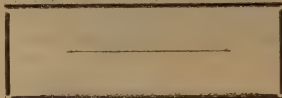
Like all Kodaks, the No. 2 Stereo is ingeniously and neatly constructed, and it retails at the moderate price of £3 10s. In a wide experience of cameras of this class we have found nothing simpler to use. The instrument weighs about 2½lb. and measures 8½in. by 6in. by 5in., so that the utmost possible facilities are given to the amateur photographer for taking up binocular work with the minimum amount of trouble.

From an accompanying pamphlet of thirty-two pages we perceive that Messrs. Kodak not only give full directions for the use of the camera, but also supply special apparatus for developing, trimming, mounting, and viewing the prints. Thus, the Kodak stereographer is distinctly encouraged, after he has "pressed the button," to "do the rest" himself.

We extract from the pamphlet some explicit directions for cutting and mounting the prints:—

"When the prints are dry, take each pair and mark with a pencil a light line across the back, from side to side, extending to within, say, 1 in. of each side (see diagram). Then trim each pair of prints as follows:—

Place the cutting shape centrally on the pair of prints and trim all round the shape. Then place the cutting shape so that the diamond-cut line nearest the right-hand side corresponds exactly with the left-hand edge of the pair of prints, and cut the print down the right-hand side of the cutting shape. This finishes



BEFORE CUTTING APART.

the trimming of one picture. Move the cutting shape so that the diamond-cut line nearest the left-hand side of the shape exactly corresponds with the right-hand edge of the other print, and cut down the left-hand side of the cutting shape. You will now have two square



AFTER CUTTING APART.

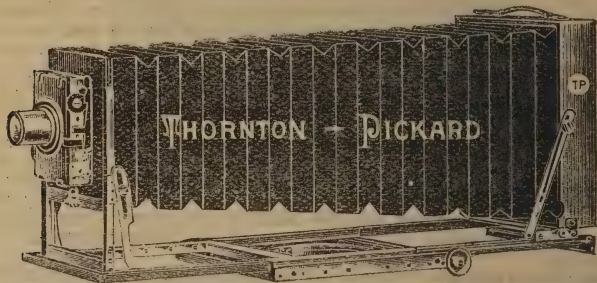
pictures which have then to be mounted on our special mounts. Place the prints exactly in the spaces provided on the mount, using the Kodak photo paste mountant. The prints must be mounted so that the right-hand side of one print and the left-hand side of the other print are adjacent, and the pencil line at the

back, instead of being continuous, will show a break in the middle, thus reversing the original position of the pictures. The prints, trimmed and mounted according to the preceding directions, will, when viewed through the stereoscope, show the well-known stereoscopic effect, the views springing into solid relief."

THE THORNTON PICKARD RUBY STAND CAMERA.

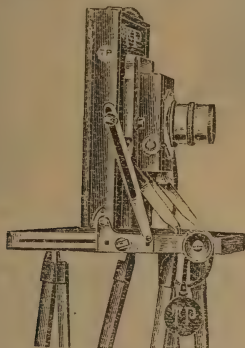
Manufactured and sold by the Thornton Pickard Manufacturing Company,
Altrincham, Cheshire.

The Triple-Extension Ruby is shown in the larger of the illustrations hereto. In the half-plate size this admits of an extension of 22 inches—a very great convenience in many respects, and especially now that telepho-



tography is becoming so popular. The extra extension is obtained by racking the bellows out at the back of the camera, with the obvious result that an even balance is given to the instrument. The milled-head screw

controlling this movement, it will be seen, is fitted to the left-hand side of the camera. Beautifully finished in parts, and as a whole, the Triple-Extension Ruby has all the features and movements of the well-known Standard pattern. We were much impressed by the lightness, elegance, and ease in working of the specimen camera submitted to us. The time has not yet come when the sedate delights and meditative calmness of stand camera photography are wholly replaced by hand-camera work, and to those whose inclinations lead them to the taking of subjects where a



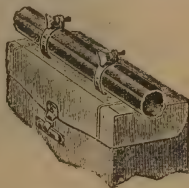
comparatively great focal length of lens is required, the Triple-Extension Ruby makes a powerful appeal.

The second of the illustrations shows the camera which is given in the Thornton Pickard "Imperial" complete outfit. It is a strongly-made instrument, embodying a swing back, rising and falling front, swing front, long extension, reversing back, rack and pinion, turntable, and plumb indicator. The set is completed by a doublet lens with iris diaphragms, three-fold stand, a time and instantaneous shutter, and a dark slide. The quarter-plate set sells for £3 10s., and the half-plate £4 4s.

THE No. 5 CYCLE POCO CAMERA.

Agents: John J. Griffin and Sons, Limited, 20-28, Sardinia Street, Lincoln's Inn Fields, London, W.C.

"The No. 5 Cycle Poco Camera sells at three guineas for the $\frac{1}{4}$ -plate and 5in. by 4in. sizes, and £4 7s. 6d. for the $\frac{1}{2}$ -plate size. The instrument is



polished mahogany dovetailed together. The metal work is polished and covered in leather, has a leather bellows, and the woodwork is made from

lacquered brass. The camera is fitted with the Unicum lens and shutter, and has a double extension, view finder, and reversing back. This is the first series of Poco cameras sold at a popular price having a reversing back. It also has a focussing scale, and bush for tripod. The following features are also embodied in the camera:—Dark slides: A simple method of loading the plates is secured by means of a hinged flap at the bottom

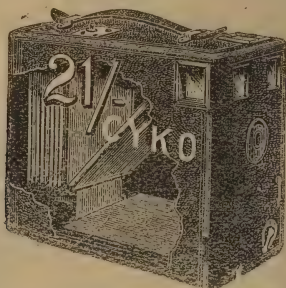


of the slide, there being no springs or catches in the slides whatever. Combined view finder and level: This camera is fitted with the device of a small metal ball running on the top of the view finder. The camera is also adapted for cyclists, as it packs in a finished leather case, which is included in the price, and may be fixed to any cycle by means of the cycle camera carrier sold for that purpose. The form of the camera is tolerably familiar to our readers, so that it will suffice to say that the instrument before us is compact and well finished.

THE GUINEA CYKO CAMERA.

Sold by John J. Griffin and Sons, Limited, 20-26, Sardinia Street, Lincoln's Inn Fields, London, W.C.

The special features of the Guinea Cyko are thus officially described:—
“(1) The camera is made of well-seasoned wood, the metal parts of brass,



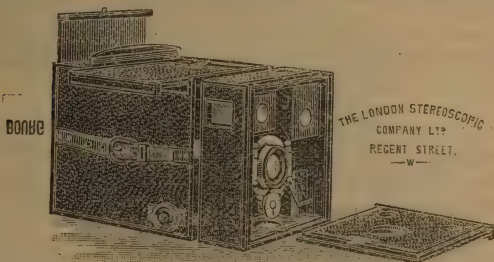
and the whole covered in morocco leather. (2) The lens is the best form of tested achromatic lens, working at $f/11$. (3) The Stops.—The improved Iris diaphragms are adjustable for three apertures, $f/11$, $f/16$, $f/22$. (4) The shutter may be adjusted to three speeds of 1-10, 1-20, and 1-40 of

second. Time exposures may also be given from 1-5 second to any longer period. The form of shutter is that giving equal illumination to the whole of the picture, and is frictionless. (5) View-finders are two in number, and are of the form known as brilliant. The image can be sharply seen even in full sunlight. (6) Loading Magazine.—The system of loading, changing, and unloading the plates is a simple and certain one. A button at the top of the camera pushed to one side is the only movement necessary. (7) Automatic Register.—As each plate is exposed, a figure at the side automatically indicates the number of plates used." We have carefully examined the camera. Although so cheap, the instrument is solidly built, and capable, we imagine, of standing all the wear and tear a hand camera is likely to receive; indeed, for its price, it is a marvel of good construction. The changing system in our hands worked to perfection, and the controlling movements of exposure, diaphragming, and differentiation between time and instantaneous are simple in the extreme. The bright, large images in the finders are a great convenience. Fairly light, and not inconveniently bulky, the Guinea Cyko is remarkably good value for the money.

A NEW CUT FILM HAND CAMERA.

Sold by the London Stereoscopic Company, 106 and 108, Regent Street, W.

The camera before us measures, when closed, 8in. by 4½in. by 5in., and weighs not much more than 2½lb. It is both portable and light, and on these counts should be appreciated by photographers. Covered in black leather and strongly made, it is carried by a small strap. A milled-head screw at the side of the instrument controls the focussing movement, a graduated scale (also at the side) indicating (in feet) the distances. The front is raised by a sliding movement, thus giving access to the lens diaphragm (iris) and shutter for the purpose of setting. The shutter release is actuated by a pin at the left-hand side of the camera. The Company's "Black Band" lens and the Unicum shutter are fitted to it.



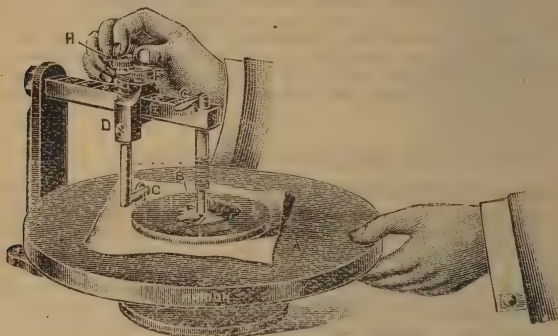
The principal features of the camera are the changing system and the employment of cut films. Twenty-four of the latter, with thin metal clips on the top of each, are placed in the magazine. The changing is effected by drawing out the septum shown on the top of the camera, the exposed film being deposited in an upper chamber. An indicator at the side shows the number of exposures that have been made. The movement in our hands worked with success and certainty. The exposed films may be removed without interfering with those not exposed, as the septum cuts off all light. The camera has two finders.

A CIRCULAR PRINT TRIMMER.

Sold by Marion and Co., Limited, Soho Square, W.C.

This machine cuts circle prints of any size up to 8in. in diameter, giving a clean edge and a true outline. It will be seen that the whole of the print is visible during trimming. The following are the official instructions for use:—

“The print is laid on the table A, upon which is placed a circular piece of glass, a little smaller than the required size of print, with its centre marked. The part which is desired to be the centre of the picture is placed underneath the rod B, which is released by C allowing the pressure



of the spring to come into contact with the glass disc, thus pressing and holding the print firmly on the table. The cutter D is then fixed at the required radius from the centre by the scale marked on E, and fixed by the milled screw F, the necessary pressure being applied to the cutting-wheel G by placing the finger on the brass head H, to which it is attached. The table is then revolved with the left hand. The pressure required on the cutting-wheel can be made heavy or light at will by regulating the brass-headed screw upon which the finger is placed.”

A NEW ACTINOMETER FOR CARBON PRINTING.

Manufactured and sold by Thos. Illingworth and Co., Willesden Junction, S.W.

This is a compact and substantially made little instrument, measuring about 3in. long by about 1½in. square. Inside is placed a roll of sensitive



silver paper, about ½in. wide, which can be drawn through a slit in the end. In the top is a circle of slightly-tinted glass, under which is fixed a screen

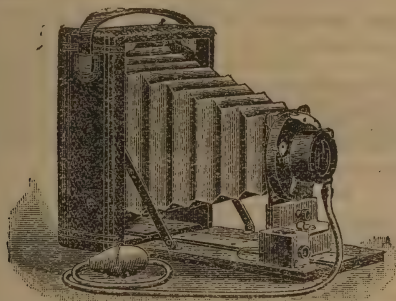
with four different tints, numbered $\frac{1}{4}$, $\frac{1}{2}$, $\frac{3}{4}$, and 1, with a square opening in the centre, through which the sensitive paper is exposed. On exposure to light the paper assumes first the tint of the $\frac{1}{4}$, and the others in succession, so that the timing of the carbon prints can be conveniently gauged. In principle this little instrument is very similar to the actinometer introduced some years ago by the late Mr. W. B. Woodbury, but is, perhaps, more convenient in use. As only $\frac{1}{4}$ in. of paper is exposed at a time, it follows that a roll of paper will last a very long time, for when the requisite tint for the negatives exposing is obtained it is only necessary to draw $\frac{1}{4}$ in. more forward through the end slit, so that only $\frac{1}{4}$ in. is used for each exposure. The instrument sells at 3s., and a cheaper form at 2s.

THE "ROLL FILM" SANDERSON HAND CAMERA.

Manufactured and sold by Geo. Houghton and Son, 80, 89, High Holborn, W.C.

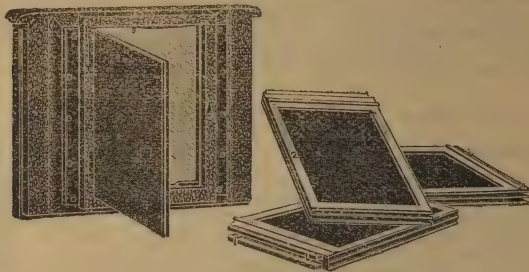
The Sanderson patent front and ordinary hand cameras are so well known it is unnecessary for us to more than state all the good features of the one are to be seen in the new "Roll Film" hand camera, which may also be supplied with a special plate adapter if required. The details as given by the makers are as follow:—

"The make and finish of the 'Sanderson' hand cameras is of the very best. The wood-work is of well-matured mahogany, polished inside. The metal work used in their construction is chiefly hard rolled brass, and all the mechanical parts are beautifully fitted and finished. The rack and pinion work is of the diagonal pattern, which imparts a freedom and smoothness which are delightful to the operator. The covering is of black morocco, and the bellows are of a special hard-grained leather, both



calculated to stand the wear and tear of every-day use. The camera is also fitted with a shoulder strap. The lens is a 'Bausch and Lomb' of very fine quality, with iris diaphragms, the focal length being that best suited for all ordinary purposes on the particular-sized camera to which it is fitted. It is of the rapid symmetrical type, has full covering power, and gives exquisite definition. It can be used in doublet form, or the separate components may be used as single lenses by unscrewing the front or back combination, either of which possesses a focal length about double that of the complete lens. A wide angle lens to screw into "Unicum" shutter in place of the ordinary lens can be supplied, also a telephoto lens of very light and compact form to use in conjunction with the 'Bausch and Lomb' lens and shutter. 'Goerz' double anastigmat,

'Dallmeyer' stigmatic, 'Cooke,' 'Beck-Steinheil' orthostigmatic, 'Busch,' and lenses by any other makers can be fitted. The shutter is the well-known 'Bausch and Lomb Unicum,' working between the lenses, and giving a varying exposure of from one second to 100th part of a second, either by hand or pneumatic release. Time or ball exposures are also obtainable, the shutter in the latter case remaining open as long as the

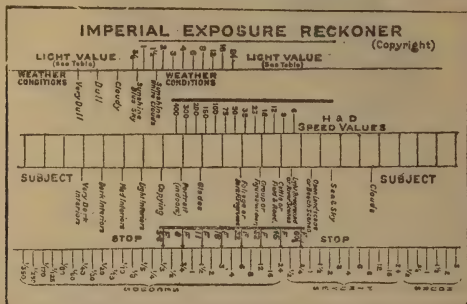


ball is pressed. The finders are of the improved brilliant form, and even in sunshine give a bright image the correct way up. The double dark slides, usually supplied for use with the plate adaptor, are of solid pattern with draw-out shutters, but polished mahogany bookform slides with spring catches can be had, if desired, at a small extra cost, as listed."

THE IMPERIAL EXPOSURE RECKONER.

Manufactured and sold by the Imperial Dry Plate Company, Limited,
Cricklewood, London, N.W.

The instrument consists of a stout piece of cardboard, about the size of a business envelope, which has two sliding arms fitted into it and flushed with the surface. The top sliding arm has printed on it the various weather conditions under which the exposure is made, and also the speed



values of the plates being used. The bottom arm has spaces allotted to various classes of subjects, which may form the object being photographed, and also to the aperture at which the lens is being worked.

A table of the light values is printed on the back of the instrument. This table is adjusted for latitudes about 53deg. N., and so is suitable for exposures in the British Isles. Other tables, which can be gummed on to the back of the meter, can be obtained if the photographer is working in other latitudes.

To find the exposure, ascertain from the table the light value corresponding to the month and time of day. Turn to the other side of the meter and move the top slide till the line corresponding to the weather conditions is opposite to the light value; then move along the lower slide till the line corresponding to the subject is opposite to the speed number of the plate employed. The stop used (F-value) will then point to the exposure required.

It will be seen that only two operations are required to ascertain the correct exposure, and five weather conditions and fifteen subject being enumerated on the face of the meter place such a fine discretionary power in the hand of the operator, that a mistake can only result from a gross error of judgment. The instrument is protected when not in use by a neat case, and the cost of it will be saved many times over by those whose limited experience causes exposure errors to be an all too real phenomenon.

THE KODAK DEVELOPING MACHINE.

Manufactured and sold by Kodak, Limited, 43, Clerkenwell Road, E.C.

The following illustrations and condensed description show how this instrument is manipulated up to the point when the developer is poured into the machine and the cover is replaced upon it.

The celluloid apron F F, Fig. 1, should be rolled back and forth several times between arbors A and B (that you may understand its workings),

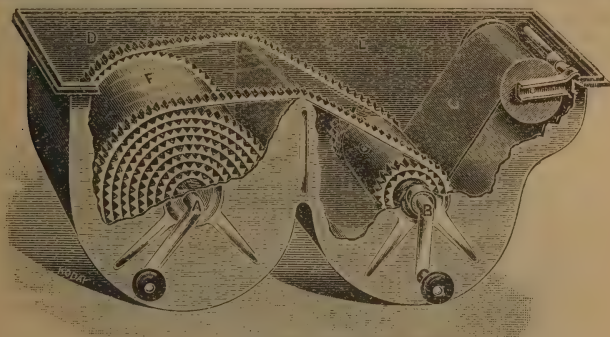


Fig. 1.

bearing in mind when you are turning the cranks that A is always to be turned to the left, and that B is always to be turned to the right. Before development the apron (F F) is all rolled on to arbor A, and will be entirely in compartment D. The spool of exposed film is then placed in the carrier at opposite end of machine, and the end of black paper is fastened under the wireguard on arbor B, and the crank turned to the right until the word "Stop" appears. We now hook the apron to arbor B, and

pour developer into compartment E, put on cover of machine, and continue turning slowly to the right until development is complete. A moment's study of the machine and cut will show that as the apron is rolled on to arbor B the black paper winds with it and that the film lies next to the black paper, face up (see G), while the corrugated rubber bands at each edge of apron allow free access of the developer to the face of film, and

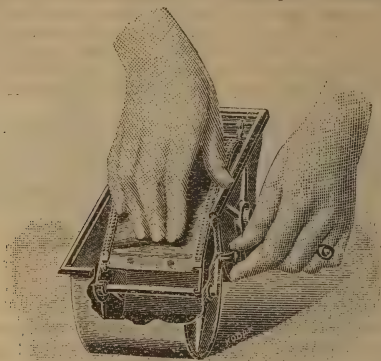


Fig. 2.

leave a sufficient space between the film and the next layer of the apron to allow the developer to flow freely and openly.

To use: Attach one end of celluloid apron to arbor A by means of the two hooks, slipping them over the lugs on arbor. (Fig. 2.)

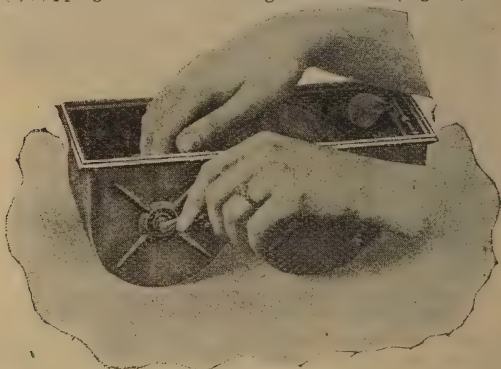


Fig. 3.

II. Turn to the left on crank attached to arbor A, and wind entire apron into compartment D, maintaining a slight tension on apron in so doing, by resting one hand upon it. (Fig. 3.)

III. Throw back spool carrier by lifting it up from underneath.

IV. Adjust the bearing to take the cartridge which you intend to develop. There are four notches in the arm which supports the spool carrier. The first (giving shortest length) is for Pocket Kodak and No. 0 Folding Pocket Kodak, the second for No. 1 Folding Pocket Kodak and

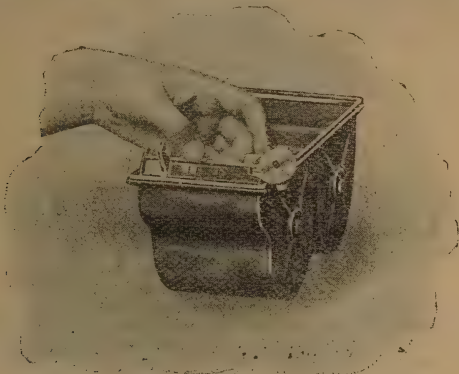


Fig. 4.

No. 1 Panoram Kodak, the third for No. 1 or No. 2 Brownie, and the fourth for No. 1A Folding Pocket Kodak. Slide the carrier along until the lug engages the proper notch. (Fig. 4.)

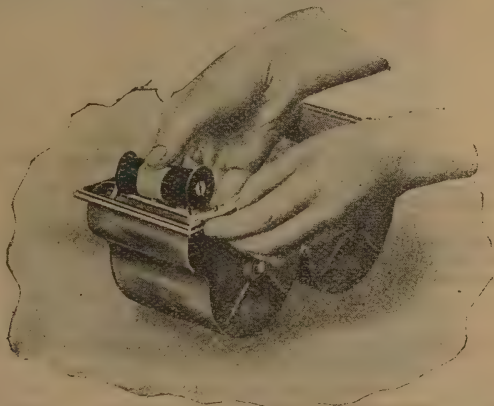


Fig. 5.

V. Place spool in carrier so that the black paper will lead from top as shown in Fig. 5, and then push carrier back into place in machine so that it occupies position shown in Fig. 1.

VI. Prepare developer and fixing solutions.

VII. Break the gummed slip that holds down the end of black paper, thread the paper underneath wire guard on arbor B (Fig. 6), and turn slowly to right until word "Stop" appears on black paper.

As a guidance in practical work the Kodak Company publish the following development table:—

Snap-shots.—Temperature 60 to 65deg. Fahr., 5min.; 70deg. Fahr., 4min.; 45deg. Fahr., 8min.

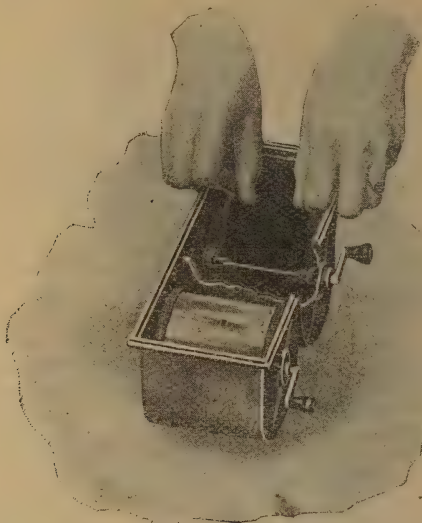


Fig. 6.

Time Exposures.—Temperature 60 to 65deg. Fahr., 4min.; 70deg. Fahr., 3min.; 45deg. Fahr., 5min.

(Use developer at 60 to 65deg., if possible.)

(Never use developer above 70deg.)

When there are both snapshots and time exposures on the same roll, develop for the snapshots, but in such cases be careful in making your time exposures not to over-expose them.

THE PLANISCOPE LENSES.

Sold by J. J. Griffin and Sons, Limited, 20-26, Sardinia Street, Lincoln's Inn Fields, W.C.

Messrs. Griffin claim that these lenses are now made of superior glass, and consist of two optically-finished combinations. They are corrected for achromatism, and are each of tested focus. They point out that the Planiscope lenses are not merely magnifiers, nor are they spectacle glasses. They may be used with confidence with any of the most expensive lenses on the market.

They also point out that they have improved the mounts by which considerably more latitude is given in the size of the hood to be used without any danger of the metal bruising by the strain. The lenses are made in four kinds: wide-angle, for increasing the range of the lens; tele-photo,



for magnifying the image; copying, for taking pictures, flowers, objets d'art, etc.; portrait, for making large heads in portraiture and increasing softness.

THE FALLOROLL CAMERA.

Sold by Jonathan Fallowfield, 146, Charing Cross Road, London, W.C.

The principal characteristics of the instrument are thus concisely described in the little handbook which accompanies it:—

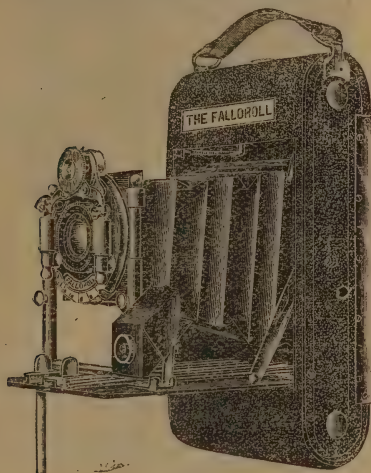


Fig. 1.

"The Falloroll camera is one of the folding type of camera, taking plates or films: the latter can be both put in and taken out in daylight, any make of film may be used in the camera, and by a simple and in-

genious arrangement a plate-holder holding two quarter plates can be used with the same back used for films. Fig. 2 will show how the plate-holder and the focussing screen may be used. To use the camera press the button on the right-hand side, and this allows the aluminium front baseboard to fall into place. To draw the lens and bellows into position, press the two small handles at the bottom of the lens, at the same time draw the camera front, with lens outwards, till the pointer on the left is at the distance (in feet) of the object which you wish to photograph. The clamping is automatic, and directly the pressure on the two handles is released they spring back and hold the front firmly in position. The camera is fitted with a tripod screw hole, and can be used either for portrait or landscape views. It has a reversible finder. The shutter of the Falloroll is the Unicum pattern, made by the well-known opticians, Messrs. Bausch and Lomb. The lens is a rapid rectilinear working at $f/8$ and having Iris diaphragms.

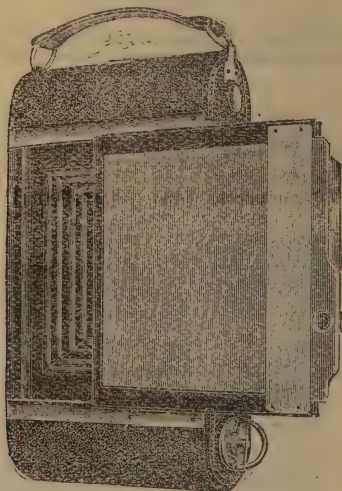


Fig. 2.

"To load the camera (see Fig. 3) place the film in the space at the top, and in such a way that the reel is working on the two small pivots, which work by springs at either side; see that the black paper winds in such a way that the spool is underneath, and bring the end across the two nickel rollers and space, and slip into the slot of the wooden reel at the bottom. Then shut the back and wind till a figure appears under the red window (which should be always at the top of the camera). The camera is now ready to take the first picture. Pull out the front, and place pointer at the distance marked on metal disc to which the object corresponds."

The makers of the Falloroll have quite succeeded in rendering it distinctive in one or two respects. The back, it will be observed, is permanently hinged, and in place of the removable panel either the focussing

screen or the double dark slide may be inserted in the focal plane. The method of inserting the spools is shown in Fig. 3. From the practical point of view, we can certify that the Falloroll is an easy instrument to work. The other features of the camera are indicated in the above-quoted

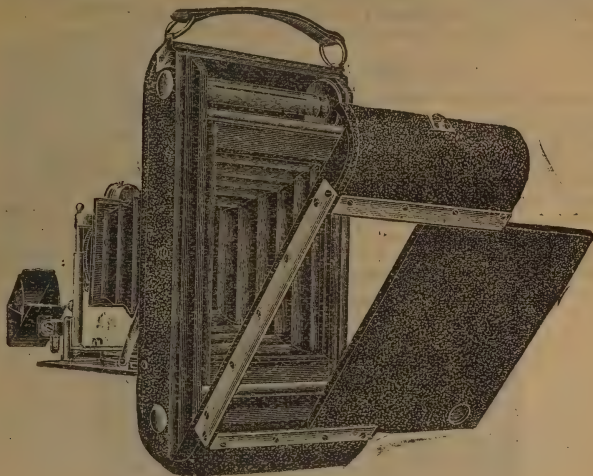


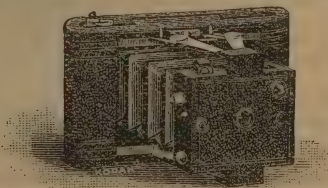
Fig. 3.

description. It is beautifully made, with metal baseboard, nickelled fittings, movable finder, and focussing scale. The shutters of the dark slide are of bright metal.

THE NO. 0 FOLDING POCKET KODAK.

Manufactured and sold by Kodak, Limited, 43, Clerkenwell Road, London, E.C.

The latest addition to the numerous family of Kodak cameras takes photographs $2\frac{1}{2}$ in. by $1\frac{1}{2}$ in., and as it only measures, when closed, $3\frac{1}{2}$ in. by $1\frac{1}{2}$ in. by $5\frac{1}{2}$ in., it may easily be carried in the pocket. It weighs about $10\frac{1}{2}$ oz.



The front of the instrument is extended by means of the well-known lazy-tongs movement, and the back is non-detachable—it folds back after a

small nickelled catch is disengaged. This simple little improvement is sure to be very widely appreciated. The Bijou Kodak is constructed of wood and aluminium, and is covered with fine-grain leather. The other features of the camera include the Kodak ever-set rotary shutter; three stops; finder; and, of course, the instrument takes spools of roll-film. Compact of form, convenient to hold or carry, and exceedingly simple to use, the No. 0 Folding Pocket Kodak costs only 28s.

THE "DALO" HAND CAMERA.

Sold by George Houghton and Son, 88 and 89, High Holborn, London, W.C.

The distinctive feature of this camera is the application of the system of what is known as daylight loading and changing to cut films. In the back of the camera is fitted a movable spool holder, to which the spool of flat films is attached. Then, by an ingenious movement the black paper is secured to a winding-reel, and as the paper is unwound a cut film is successively brought into the focal plane, and, after exposure, deposited in a receiving-box in the base of the camera. In other words, one gets the peculiar advantages of a roll-film camera utilised in a system expressly designed to afford those photographers who have a "pendant" for the



use of cut films the opportunity of gratifying their tastes. It is fully explained for the benefit of beginners and others in the "Dalo" booklet, copies of which may be had of Messrs. Houghton. The other features of the camera are:—Two brilliant finders and a rotating diaphragm, and a time and instantaneous shutter, both actuated from the front of the camera. The release is at the side. The milled head shown at the back of the camera controls the winding-key for the black paper. The large key turns the spool, which revolves in the body of the instrument. A little catch at the top of the camera allows of the front being extended, and when that catch is released the front springs back into position and performs the peculiar office of pressing against the film in the focal plane, thus holding it flat and in register.

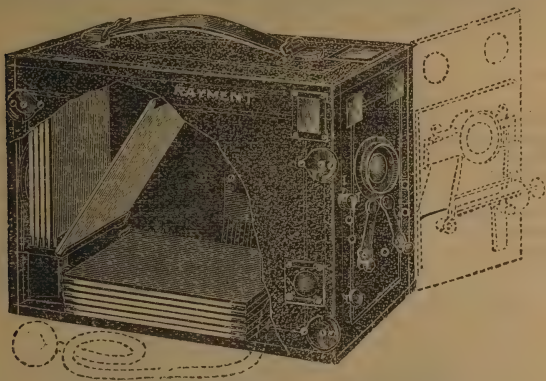
A MAGAZINE HAND OR STAND PLATE CAMERA.

To carry 12 dry plates $4\frac{1}{2}$ in. by $3\frac{1}{4}$ in.

Sold by Arthur Rayment, 125, Earlham Grove, Forest Gate, London, E.

This camera carries twelve plates, which are successively and automatically exposed without dark slides. The number of plates exposed is mechanically recorded and is visibly indicated outside the camera. The plate-changing mechanism is simple and reliable. The camera possesses

an achromatic rapid rectilinear lens, with iris diaphragm. Supplementary lenses are arranged, which work between the combinations of the rapid rectilinear and enable quite near objects to be photographed. The shutter allows prolonged or time exposures as well as varying speeds of instan-

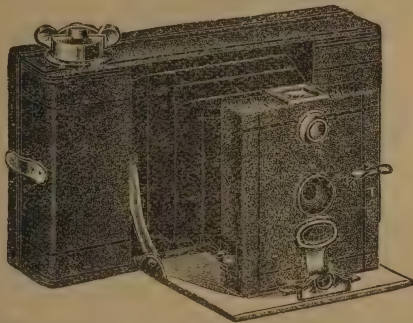


taneity. It is released by finger-pressure or by pneumatic ball, as may be preferred. Two brilliant finders are included; these give clear and distinct images, not upside down, but erect. The exterior of the camera is unobtrusive, and is covered with hard-grained leather.

THE "ROLL FILM FOLDING LITTLE NIPPER."

Sold by W. Butcher and Sons, Camera House, St. Bride Street, E.C.

The type of instrument will be well understood from the illustration, and it has all the principal features commonly looked for in cameras of



this construction. It folds into a very small space, and may be carried in the pocket without the slightest inconvenience. A touch opens the

camera, and the movement of a catch imparts rigidity to the body. Taking spooled film, a tiny circular red window allows the number of the film to be exposed to be seen; there is a central finder, and pressure of the lever at the side releases the shutter. Daylight cartridges at 7d. per spool (six exposures) are sold for use in the camera, as a guide to the manipulation of which Messrs. Butcher issue a clearly-written book of instructions.

"THE ILFORD CAMERA"

Sold by Ilford, Limited, Ilford, London, E.

Measuring 9 by 5 by $6\frac{1}{4}$ inches, the Ilford camera is well proportioned and uncumbersome, and unloaded weighs under four pounds. The body is of mahogany, covered leatherette, and it carries a charge of 40 cut films in two packets of 20. The lens works at $f/8$, and is controlled by a Unicum shutter, giving time and shutter exposures down to 1-100th of a second; whilst an exposure indicator, two large brilliant finders, and two tripod sockets complete the details of the instrument. Adjustment of the focus is obtained by actuating a small arm, shown on the right side of the camera in the appended cuts. The essentially novel feature of the Ilford camera is the system of changing adopted with the cut films that are used

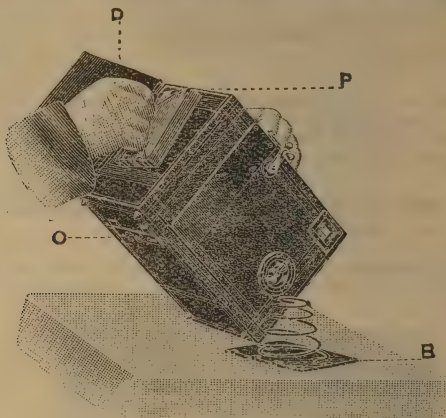


Fig. 1.

in conjunction with separate backings. The principle of that system will be best grasped by a reference to the following illustrated description:—

To Load the Camera.—To load the camera (which must be done in the dark room) open the door at back (D, Fig. 1) and remove the diaphragm with spring (B, Fig. 1). Take a packet of films from the box, hold by the edges, gently withdraw the cardboard shield from in front of the first film, and place the packet within the magazine as shown in Fig. 1. Unwind the string from the hook, hold the packet of films and backings in position with the left hand, and with the right hand carefully loosen and withdraw the string by the hook. Repeat with a second packet of films, and replace the diaphragm. Close door. The camera is now fully loaded.

To Change the Film.—Move the handle H. from above downwards, as shown in Figs. 2 and 3. Hold the camera with front tilted downwards, as shown in Figs. 1 and 3 and draw handle C. (Fig. 2) smartly to the right out from the camera (Fig. 3). Draw the handle C. (Fig. 3) home, that is to say,

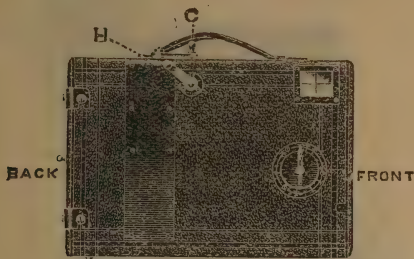


Fig. 2.

to the limit of motion. This releases the exposed film. Push the handle C. back into position (C. Fig. 2). This releases the backing. Move the handle H. back to position, and on no account omit this between each change of film and backing. The flap must be closed after each change, and you must never attempt to move the handle C. (Fig. 2) before depressing the handle H. as shown in Fig. 2. During the entire operation of

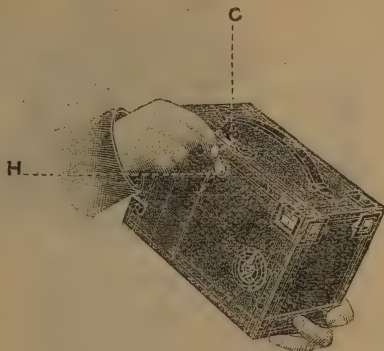


Fig. 3.

changing the camera must be tilted downwards as indicated, or the film and backing will not drop into the well. The camera must never be pointed straight downwards in changing, but tilted as shown. When the camera is used horizontally it must be restored to the vertical position

before changing. Changing must not be attempted with the camera held horizontally.

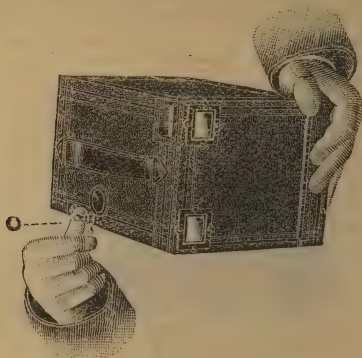


Fig. 4.

To Remove the Films.—The exposed films must be removed in the dark room only. The door below the camera (O. Fig 4) is opened, and the films and backings removed as shown (Fig. 5). Separate the films from the backings, and develop in the usual way. Or, pack the exposed films face

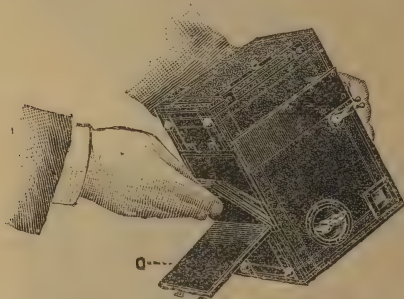


Fig. 5.

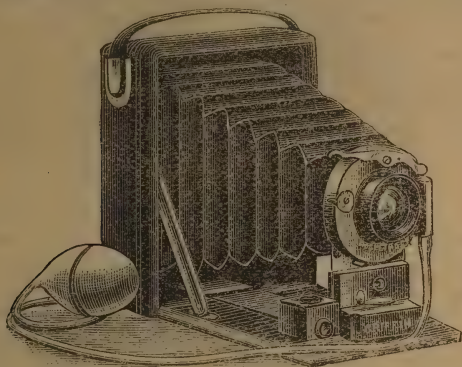
to face, without anything between, in clean brown paper, and place in an original box, until ready to develop.

THE "POCKET-POCO CAMERA."

Sold by John J. Griffin and Sons, Limited, 20-28, Lincoln's Inn Fields, W.C.

Messrs. Griffin's intention in introducing this camera is to place within reach of all at a reasonable price an instrument which will turn out the very finest photographic pictures at the least expenditure of inconvenience to the worker. The Pocket POCO can be slipped into the pocket or carried

in the hand with the greatest facility, and it can further be attached to a stand for time exposures or portrait work. The lens is of the rapid-rectilinear form, thus making it useful for every class of photography. The selling price for camera complete with one slide is 37s. 6d.; extra slides 1s. 6d. each. These latter meet the often-expressed wish of certain experienced photographers who believe in the principle of one slide one plate—a simplification which prevents double exposures and involves in the



case of Pocket Poco slides no additional bulk of weight over the book-form of slide.

The instrument when closed measures $5\frac{1}{4}$ by $4\frac{1}{4}$ by $1\frac{1}{2}$ inches, with a draw of 6 inches. The body is of mahogany, covered with seal-grain leather, and has a leather handle; the fittings are nickelled brass, and the shutter is lacquered. The bellows is of lined Russia leather. Other features are a ground-glass focussing screen, a sliding front, reversible finder, a bulb and tube controlled shutter, doublet lens, and two tripods.

A STEREOSCOPIC KODAK.

Manufactured by Kodak, Limited, 43, Clerkenwell Road, E.C.

Closed, the Stereo Weno only measures $2\frac{1}{2}$ in. by $4\frac{1}{2}$ in. by $10\frac{1}{2}$ in., and it weighs about 2lbs. After considerable experience with the Panoram in the field, we find that the Stereo Weno involves little, if any more



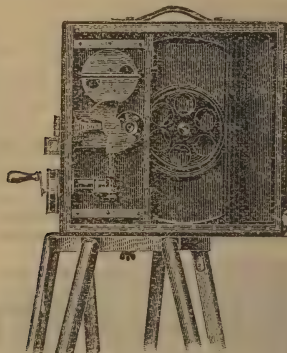
trouble to hold than the first-named popular instrument. As the illustration shows, the Stereo Weno is built on the twin-camera principle. It

takes the films supplied for the No. 3 F. P. K.; or, in other words, two $3\frac{1}{4}$ by $3\frac{1}{4}$ pictures, equalling a total base line of $6\frac{1}{2}$ in., are obtained. Two doublet lenses of 5 in. focus, fitted with iris diaphragms, account for the optical part of the system. An indicator points to bulb, instantaneous and time exposures. The shutter is ever set, and, working in the same plane as the lenses, the movement of a lever controlling the irises assures the apertures, which are f-8, 16, 32, 64, and 128, being identical. This is a vital point in such a camera, which we are glad to find so well provided for. A bright finder; an engraved focussing scale, and a tripod screw socket, complete the equipment of a singularly useful stereoscopic hand camera. The lens centres are appreciably over 3 in. apart—a trifle too wide for objects within only a few feet from the camera, but an advantage, perhaps, for more distant subjects. To users of the Stereo Weno a manual of instructions is to be issued; and we notice that Messrs. Kodak list a special cutting shape, printing frame, mounts, stereoscopes, etc.

THE KAMMATOGRAPH.

Manufactured and sold by L. Kamm and Co., 27, Powell Street, Goswell Road, E.C.

The Kammatograph is an instrument the purpose of which is to bring the making and the projection of "animated photographs" within the grasp of the amateur, without the necessity of employing a celluloid ribbon. The pictures, several hundred in number, are taken upon a circular gelatine plate, which plate can be developed in a dish with the ordinary re-agents. A negative plate thus developed will yield a positive by contact, as in the case of an ordinary lantern slide. The camera used for taking the negative serves afterwards as a lantern attachment for



projecting the positive. In each case the turning of a handle causes the plate, which is 12 in. in diameter and circular in form, to travel eccentrically, so that the part immediately behind the lens never arrives there a second time. The little pictures are thus made to form a spiral pattern on the plate. The risk of using inflammable celluloid is altogether obviated, and the arrangement is quite as safe in use as the ordinary optical lantern.

THE DISC ACTINOMETER.

Sold by the Autotype Company, 74, New Oxford Street, London, W.

Retailing at the small price of one shilling, this little instrument reduces the actinometry of carbon printing to its simplest possible form



The directions engraved on the block indicate the manner of its use. The casing is of light material, and one circular piece of paper will obviously answer for many exposures, as the lid revolves. As claimed for it, the disc actinometer is both hardy and efficient.

THE FOCUSING COOKE LENS.

Manufactured and sold by Taylor, Taylor, and Hobson, Stoughton Street Works, Leicester.

Messrs. Taylor, Taylor, and Hobson have recently introduced a new type of mount for their well-known Cooke lenses, and have submitted a specimen to us for inspection. In outward appearance these lenses do not differ materially from the usual characteristics of Cooke lenses, excepting that a new alloy of aluminium has been substituted for brass, and that the hood of the lens is provided with a scale indicating the anterior focus when the various divisions are brought opposite the indicator by rotation. The workmanship of the new mount is excellent. The novelty of this mode of focussing, if such it may be called, consists in the variability of the separation of the front lenses. By slightly increasing the air-space between them, an appreciable shortening of the focus of the system is effected, and as this is done by screw adjustment it is easy to fix the focus for distances between very near objects and infinity. We have, in fact, a scale provided for objects at 3, 4, 6, and 10 yards, and infinite distance from the camera. It is well known that modern anastigmats are extremely sensitive, and that their performance is materially affected by their adjustment. The question may therefore be asked, does the performance of the Cooke lens suffer when the present system of focussing is used? A trial of the lens has satisfied us that Messrs. Taylor, Taylor, and Hobson are right in using the new system for hand-camera lenses. We notice a very slight difference in the

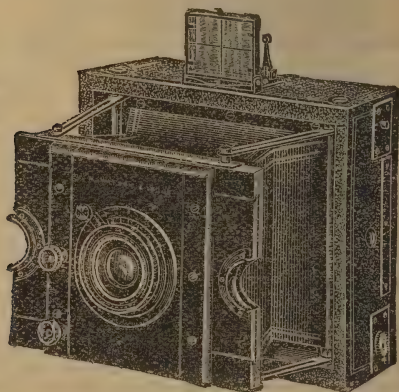
quality of the image at the corners of the plate when the lens is used for very close objects; but, on the other hand, the greater accuracy in focussing by means of the enlarged scale on the lens-hood, as compared with that which would be provided upon a hand camera, is an advantage of far greater importance. The lens system, moreover, still remains at its best when the scale is returned to its normal position. We notice with feelings of reverent regard for the memory of an old friend, the former editor of this paper, that Messrs. Taylor, Taylor, and Hobson have quoted as a prophecy the following extract from the late J. Traill Taylor's book on the Optics of Photography:—"Perhaps the most useful lens of all, should it ever reach the stage of being manufactured, will be one in which, by the rotation of a collar, the focus of the lens, complete in itself, is susceptible of being altered to a considerable extent."

This is another testimony to the late J. Traill Taylor's foresight in practical optics. Although the new focussing device of Messrs. Taylor, Taylor, and Hobson does not provide that considerable latitude in the equivalent focus of the lens which our late editor desired, yet it must be looked upon as a step in that direction, and we believe users of the hand camera will find it a distinct advantage. Messrs. Taylor, Taylor, and Hobson have also sent us photographs of a test chart for astigmatism, taken with one of these lenses. Results are shown for each of the distances engraved on the lens, and the photographs are remarkably good over an angle of 50deg.

A FOCAL PLANE CAMERA.

Sold by W. Watson and Sons, 313, High Holborn, London, W.C.

There is evidently a growing demand for focal plane hand cameras, and Messrs. Watson, we think, are wise in entering the market with



the beautiful little instrument before us. Here are its main features concisely summarised: The camera is of fixed extension; focussing is

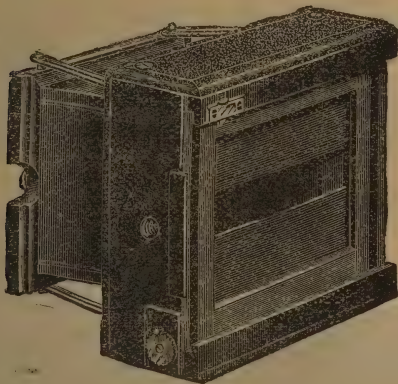
effected by a lever movement controlling the lens, which moves posteriorly or anteriorly in a tube; the focal plane shutter allows of both time and instantaneous exposure being given. A half plate when folded up measures 8in. by 7in. by 3in.; the camera front moves horizontally and vertically; black leather is used to cover the instrument, the body of which is made of ebonised mahogany.

Messrs. Watson supply the following instructions for working the camera:—

To open the camera, draw the front out by means of the two projecting grips provided, as far as it will go; the slotted metal arms will then spring into position and hold it securely.

To focus the picture, set the lever so that the bevelled edge of it coincides with the figure indicating the distance of the objects. The figures marked indicate distances in yards.

To close the camera, press out the supporting arms on one side, letting the front of the camera on that side go back slightly, then press out the



arms on the opposite side, when the front, being released, can be closed into the body.

To set the shutter, wind the blind by means of disc having two projecting knobs on one side of the shutter as far as it will go; discharge by pressing the knob on the front edge of the body.

To alter the width of slit (in half-plate shutters), pull straight out, but do not turn, the small bright milled head on the numbered disc, and wind the knob on the opposite side of shutter until the width required—as shown by the figures on disc (which represent the width of slit in m/m)—comes opposite the little vernier projecting over disc. Then release the milled head on disc, which will lock the blind in position; now wind up the blind. This applies to half-plate shutters only. For $\frac{1}{4}$ -plate and 5 by 4 the top one of the two milled heads is turned to the left to open the slit, and to the right to close it. When the figure

5 shows at the aperture, the slit is fully closed. The width of the slit should not be altered after the shutter is wound up.

Time Exposures.—Pull the small lever up to the letter T, and pull out small-milled head on disc. Wind the blind right up and press and release the discharger; the shutter will remain open till this is pressed again to close it.

Shutter Speeds.—The speed of the shutter can be altered by turning the bottom milled knob, and the exact exposure will be shown from the figures 1, 2, 3, 4, 5, and 6. The most useful speeds result from the following combinations:—

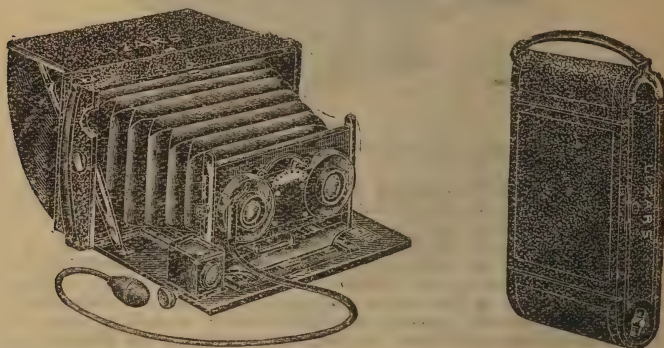
Indicator.	Width of Slit.	Exposure.
1	Full opening	1-5th sec.
2	Full opening	1-12th sec.
1	60	1-20th sec.
3	60	1-35th sec.
6	60	1-80th sec.
6	40	1-125th sec.
6	25	1-200th sec.
6	15	1-300th sec.
6	10	1-500th sec.
3	5	1-600th sec.
5	5	1-800th sec.
6	5	1-1,000th sec.

Either a Goerz or a Holostigmat lens may be fitted to the camera; and it is adapted to take a special form of changing box.

LIZAR'S CHALLENGE MODEL B. STEREOSCOPIC CAMERA.

J. Lizar's, Glasgow.

This camera measures 8½in. by 4½in. by 2in., and from these measurements it may be seen that this is practically a Pocket Stereo Camera. It



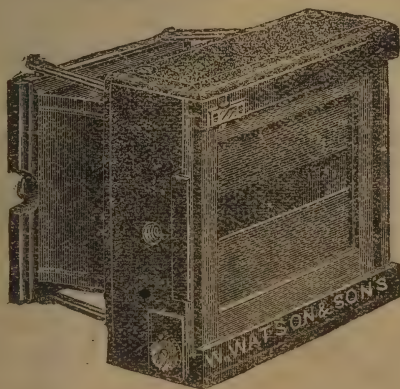
is of such a convenient form that it may be easily attached to a bicycle. The camera has been constructed in two forms—namely, with fixed division

in bellows, and with loose division. With the fixed division, pictures either stereoscopic or lantern plate size ($3\frac{1}{4}$ in. square), two on one plate, may be produced, the latter being obtained by capping the one lens and making the exposure with the other. The instrument with the loose division will produce either stereoscopic pictures or, by the removal of the division, a picture $6\frac{1}{4}$ in. by $3\frac{1}{4}$ in. For the landscape size it is necessary to have an extra front panel and a half-plate lens, which take the place of the stereo. shutter and lenses. It is made in Spanish mahogany, either polished or covered in hard-grained leather. Focussing hood, as shown in illustration, and leather bellows. The Bausch and Lomb shutters work either for time or instantaneous. The shutters are ever set, and are operated simultaneously by one pneumatic or trigger release. The slides are three in number, double, and of the solid form, with aluminium shutters. The double light trap which is fitted to the slides is an entirely new device. The lenses are of the rapid rectilinear type, with Iris diaphragms, controlled by one lever. There are two brilliant finders set as near as possible to show the same view as that given by the lenses. The camera is provided with swing front, swing back, and rack and pinion for focussing.

THE "VRIL" FOCAL PLANE SHUTTER.

Manufactured by Watson & Sons, 313, High Holborn, WC.

In this shutter the new features are *time* as well as instantaneous exposures. In addition, the apertures for the slit are regulated by turning the milled head on the outside of the shutter, and a scale is provided to show exactly the width of the slit being used. A numbered



disc at the bottom of the shutter shows at a glance the tension of the spring, and the exact speed that the shutter is working at is ascertained from a table issued with each shutter, giving the various combinations of width of slit and tension of spring. A valuable feature in this shutter is

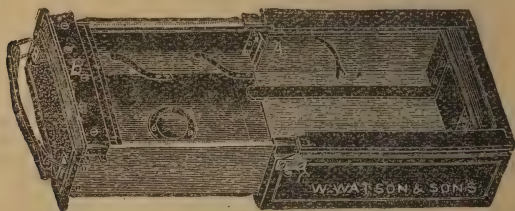
that the slit can be used with the opening the full width of the plate, and in this way a much slower shutter exposure can be given than is generally obtainable, the range of speeds varying from 1-5th to 1-1,000th of a second. The method of alteration from time to instantaneous is very simple, and can be brought into use immediately.

WATSON'S GAMBIER BOLTON CAMERA.

The "Gambier Bolton" Camera is supplied with the Vril Focal Plane Shutter, giving time and instantaneous exposures, and greatly reducing the size and bulk of the camera.

WATSON'S IMPROVED CHANGING BOX.

A new pattern of changing box is here shown, in which the plate or film may be changed, whatever the position of the box. To change the plate, draw out the inner portion of the magazine, as shown in the illustration,



and return it to its position. It can be used equally well for plates or film sheaths, and can be adapted to practically any camera.

WATSON'S "DURABLE" SHUTTER RELEASE.

This release has been designed to overcome the failings of the pneumatic release, the india-rubber of which, especially in hot climates or



Fig. 1.



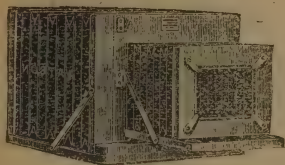
Fig. 2.

when used but occasionally, is found to perish. The "Durable" consists of small brass beads through which runs a steel wire, connected to the

lever which discharges the shutter. The beads are enclosed in a woven cover, and connected with the lower of the two pushes marked "A" in the illustration No. 1. The wire is attached to the upper of the two, and to discharge the shutter the two knobs are brought together (Sketch No. 2): the action cannot fail, because the outer cover is incompressible, and the wire must therefore pull through it. It can be fitted to any of the roller blind types of shutter. This release is also of great advantage in the hemispherical forms of studio shutters; these are usually opened by the expansion of an india-rubber bellows, into which the air is driven when the ball is squeezed; but under hard wear the bellows are found to puncture and the air escapes. With the "Durable" Discharger, however, this is obviated. The discharger is very flexible, and being entirely of metal, is practically indestructible.

NEW COLLAPSING ENLARGER.

W. Watson and Sons have just introduced a new pattern enlarger for half-plate negatives. As will be seen from the sketch, the negative is carried in a focussing frame working to graduated distances, according to the size of the enlargement required. The bromide paper to be enlarged from is fitted to the door at the back of the enlarger, which falls down,



OPEN.



CLOSED.

for greater convenience when placing the paper in position. It is not secured by pins, but a sheet of glass is placed over it, and by this method less handling of the paper is entailed, and less liability to markings. The whole closes up into a very compact and portable shape, and, being focussed, is always ready for use.

HOLOSTIGMAT LENSES.

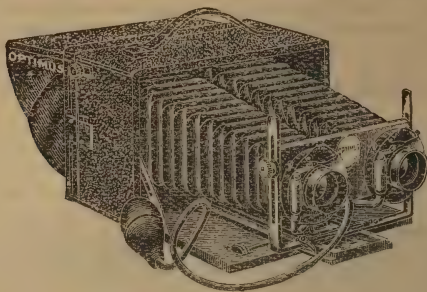
Messrs. Watson and Sons now fit to these focussing flanges for use on hand cameras, at a small extra cost.

"OPTIMUS" STEREOSCOPIC HAND AND STAND CAMERA.

(Perkin, Son, and Co., Ltd., 93, Hatton Garden, London.)

This camera has been very much improved, and its field of usefulness greatly extended. The instrument is now fitted with a twin bellows

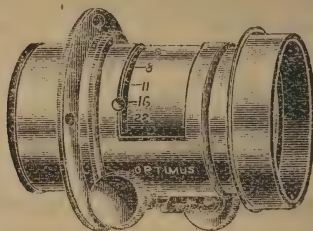
of long extension. By a new device the rising and falling action of the fronts has been greatly increased, and "between lens" metal shutters have been substituted for the roller blind pattern hitherto supplied; these shutters are released by means of a ball and tube. The camera when folded occupies the smallest of space. A special feature of this instrument is that, although it is ostensibly a stereoscopic camera,



yet by simply attaching a focussing glass screen of $3\frac{1}{4}$ by $3\frac{1}{4}$ size, it can be used as a twin lens camera, taking lantern size pictures. In this case one shutter—i.e., that attached to the lens acting as the finder—remains open, whilst the other, working independently, gives the exposure to the smallest fraction of a second. Practically any make and type of lens can be used on this camera, providing the focus be of reasonable length. This instrument is a combination of strength and lightness, the whole being of very excellent workmanship and finish.

"OPTIMUS" PORTRAIT LENSES FOR ENLARGING.

A very great improvement has been made in portrait lenses for enlarging by fitting them with Iris instead of Waterhouse diaphragms. The

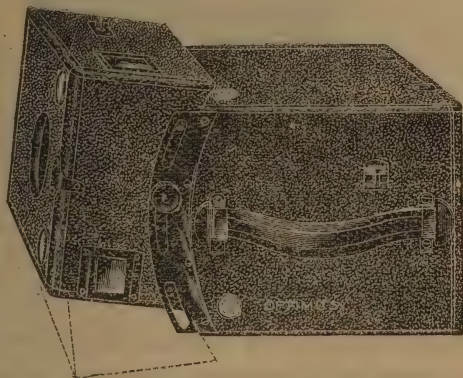


convenience of having Iris arrangement to the front lens can only be fully appreciated by an operator who has previously been using the

Waterhouse system. A gradual adjustment of the aperture allows of just the required amount of sharpness being obtained on the bromide paper. Perken, Son, and Co., Ltd., are fitting all their superior projection instruments with Iris diaphragms, and having thoroughly studied the art of enlarging, have brought their instruments to a very high stage of perfection. A pamphlet on enlarging, sent gratis, has just been issued by this firm. This pamphlet contains many hints and suggestions never hitherto published, and should be useful to all interested in the subject, whether tyro or expert.

"OPTIMUS" "DOPFA" MAGAZINE HAND CAMERA.

A new magazine camera has just been issued by Perken, Son, and Co., Ltd., of Hatton Garden, which supplies a long-felt want with this particular class of instrument. It is called the Optimus "Dopfa," and is so arranged that the user has all the advantages of a swing back. With magazine plate cameras it has always been a serious objection that buildings could not be taken without either an absurd amount of foreground or with the buildings having a leaning appearance. The patented front movement of the "Dopfa" camera overcomes this diffi-



culty. The rising and falling of the lens is so arranged that the centre of the lens is always opposite the centre of the plate, no matter in what position the swing front may be. It is therefore the equivalent of a swing back, and the resulting photographs are free from distortion. The camera carries twelve quarter-plates. It is furnished with finders and levels for both vertical and horizontal positions, and the lens is an Optimus Rapid Rectilinear. The outside dimensions are but 9 in. by 5 in. by 6 in.

THE CORNERPIECE.

Manufactured and sold by W. Tylar, 41, High Street, Aston, Birmingham.

Suspended in the corner of a room, this bracket photograph-holder makes a pleasing piece of domestic decoration. It is constructed of solid hardwood moulding, and the two backs of the frame, which are kept in position by small turn-buttons, are easily removed, so that the photo-



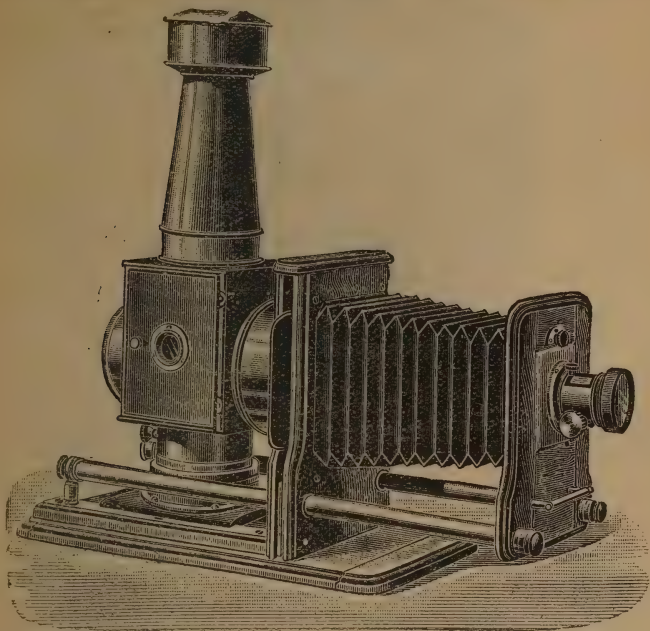
graphs may be changed from time to time. Upon the level top a small article of bric-à-brac can be safely placed. The cornerpiece, when not in use, may be folded up. It retails at 4s., and is well worth the money. The idea is neatly carried out.

RAYMENT'S PERFECTED CANTILEVER ENLARGER.

Arthur Rayment, 125, Earlham Grove, Forest Gate, London.

The photographic enlarger represented below has been designed and constructed with much care and thought. The apparatus includes the necessary adjuncts and movements requisite for the professional or amateur worker who desires to attain good results, namely, a compound condensing lens (two plano-convex lenses), mounted in brass cylinders; a Petzval projection lens, giving good definition, and fitted with rack and pinion adjustment and non-actinic glass cap; a paraffin oil lamp, with circular burner, giving a powerful light, adjustable from the exterior. If desired, the instrument may be fitted with either incandescent gas burner or incandescent electric burner. The light is fixed upon a sliding base,

so that it may be retired from or advanced near to the condenser. The chimney and the lamp chamber are made of Russian iron. A door is provided having sight-hole for observing the light. Opening the door uncovers a sheet of ruby glass arranged so as to shed a non-actinic light amply sufficient for the operator to work by. The tube which overlaps



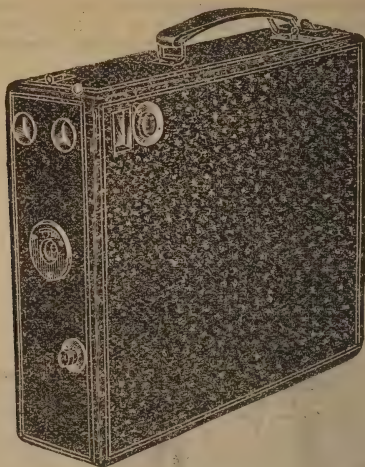
the mount of the condenser is of polished brass, as is also the cylindrical tube at the back of the lamp chamber; the last-mentioned tube contains a polished metal reflector.

THE APTUS PANORAMIC MAGAZINE HAND CAMERA.

Manufactured and sold by Sharp and Hitchmough, 101, Dale Street, Liverpool.

For 30s. Messrs. Sharp and Hitchmough supply the photographer with a camera which takes panoramic-shaped photographs on glass supports. The instrument holds sheaths to the size of the half of a half-plate, that is 6½ in. by 2½ in. It is fitted with a lens of 7 in. focus (approx.), and thus, with a judicious choice of subject, and taking care that near objects are removed a considerable distance from the camera, photographs in panoramic perspective and without distortion may be obtained. Either

12-plate sheaths or 24-film sheaths may be used in the camera, which is fitted with an indicator of exposures, rotating diaphragms to the lens,



finder, time and instantaneous shutter. The camera weighs 2lb. 8oz. and measures 10in. by 9in. by 3in.

PRACTICAL NOTES AND SUGGESTIONS OF THE YEAR.

(Compiled from various Sources by the EDITOR.)

A Developer for Hot Weather.

THE softening of the gelatine film of the plate during development in hot summer weather, or in tropical climates, has always been a troublesome annoyance to the photographer, and it seems difficult to find a satisfactory preventative of that trouble. But very few substances that have the property of hardening gelatine can be introduced into the developer without decomposition. Magnesium sulphate has been recommended as a preventative of frilling when added to the developer, and in practice is found to possess considerable merit. But in cases where the temperature is unusually high it does not exert sufficient influence. When added in large quantities to a developer containing mineral alkali it causes changes that are not all favourable, and also does not seem to exert the power of hardening that it possesses under ordinary conditions. Magnesium sulphate under ordinary conditions would be precipitated by the carbonates and hydroxides of the alkali metals, which result is probably only prevented by the presence of pyro. When ammonia is the alkali used the conditions are better, magnesium salts being only partially precipitated by ammonia. The presence of a sufficient quantity of a neutral ammonium salt completely prevents the precipitation by ammonia. If, then, ammonium sulphate is used in conjunction with magnesium sulphate we have a hardening agent that can be added to an ammonia developer in any desired quantity without decomposition, and will be found to possess considerable hardening power; in fact, it appears sufficiently powerful to cope with any natural temperature that may be encountered. This gives us the power (by using an ammonia developer) to develop when necessary in spite of extreme temperature. A convenient strength of solution is—

Magnesium sulphate	1 oz.
Ammonium sulphate	1 oz.
Water	10 oz.

This can be used with any developer where ammonia is the alkali used. One dram of this solution to each three ounces of developer will be found sufficient for ordinary hot summer weather, but a safe rule is hard to give, the amount required depending on the excess of temperature. Any amount necessary of this solution can be used. In cases where it is necessary to use a hardening agent as the above, when the temperature is so high as to render a plain developer unsafe, one is apt to keep on what is practically the safe side in this case by using a rather generous quantity of the above solution, thus hardening the film and interfering with the action of the developer, so that in practice the best results seem to be obtained with ample exposure and plenty of pyro. The fixing bath should also be renewed somewhat frequently to insure the best results.

D. S. HARDING.

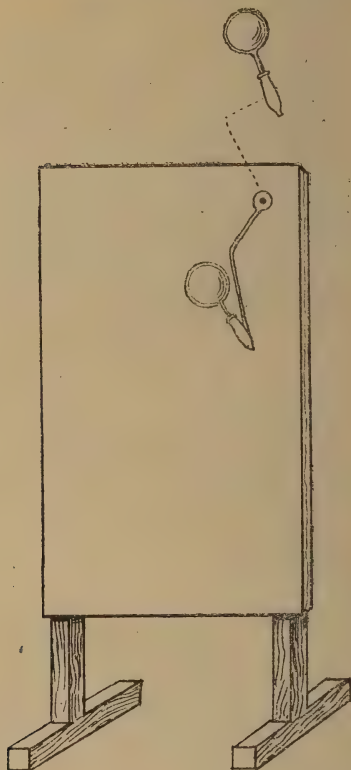
A Simple and Safe Light for Beginners.

Here it is, then. Place a board 24ins. square, or larger, 4 to 5ft. away from developing dish; then, on the other side of the board, place a lighted candle (mind, not a paraffin lamp), then proceed to work. Try it, and the result will surprise you.

GEO. W. VALENTINE.

A Simple Way of Focussing Enlargements.

A great many people who are anxious to produce their own enlargements often find the focussing a very difficult matter. By a simple contrivance, and by anyone possessing an ordinary reading-glass, this can easily be overcome, and at a minimum of cost. Procure a stout wire, similar to that used in constructing parrot cages, bend one end so as



to form an eyelet sufficiently large to take a fair-sized screw, attach to the other end a socket by means of solder, large enough to admit the reading-glass handle, this can be made out of a piece of zinc or tin. All that requires to be done is to attach the wire to the top of the easel by means of the screw, not too tightly, in order that it may be turned up out of the way after focussing; then, by bending the wire at a slight angle to suit the sight of the operator, the picture can be focussed with ease.

GEO. H. DUNMORE.

Anti-Halation Backings.

Some of the formulæ recommended as backings contain dextrine as well as caramel, and the result, if no hygroscopic substance be used, is, when dry, an extremely powdery backing. A typical formula is composed of caramel, burnt sienna, dextrine, glycerine, alcohol and water, wherein we have dextrine added to make the backing dry, and glycerine to keep it wet. Some formulæ for backings contain a colouring matter without dextrine and glycerine, which have the disadvantage of becoming chippy unless the glycerine be added, but this has the disadvantage of retarding the drying of the backing. In order to avoid these troubles M. Hélain has suggested the use of ammonium chloride instead of the glycerine, as the crystals of this salt possess, as is probably well known, great flexibility. The formulæ suggested by M. Hélain are as follow:—

I.	Lamp black	10—12 parts.
	Yellow dextrine	100 "
	Ammonium chloride	6 "
	Water	90—100 "

The lamp black should be moistened with spirit, the dextrine added, and then the water, in which the salt should be dissolved.

II.	Scarlet croceine	10 parts.
	Yellow dextrine	100 "
	Ammonium chloride	6 "
	Water	90—100 "

III.	Red ochre	200 "
	Yellow dextrine	100 "
	Ammonium chloride	6 "
	Water	100 "

IV. As No. III., but with only 25 parts of ochre.

No. I. proved to be the best backing, though closely approached by No. II. No. IV. was quite as efficacious as No. III., though containing only one-eighth of the colouring matter.

The use of ammonium chloride for this purpose is quite novel, and it may well be a useful addition to the caramel backings instead of glycerine or other hygroscopic substances.

Cold Dark Rooms.

Many photographers have already experienced, either in their comfort or by retarded development, or the like, inconvenience from the cold weather. Of course, in all well-appointed establishments attention is paid to the heating of the dark rooms during the winter weather. This is not, however, always the case in minor establishments, where often the dark room is a small apartment at the top of the house where the studio is situated; or, in the case of amateurs, frequently in the basement, where possibly it is little more than a cupboard. In either case, alike for the comfort of the worker and the action of the chemicals, some method of heating becomes necessary, and then comes the question as to the best method. Frequently cost becomes an important factor in the case. A gas-stove naturally suggests itself as the most convenient, and in some respects so it is, but gas is not always available, and, even when it is, it does not always prove the best, for the fumes from it, if they are not carried away by good ventilation, are often injurious to the health of those who have to inhale them for long periods together. Moreover, the fumes given off from burning gas are deleterious in some photographic

processes—the carbon process, to wit. Slow-combustion stoves of the Tortoise type are very convenient, but they require a flue to carry off the smoke, which is not always possible, and, even if it were, there is always the dust from it to be considered whenever it is fresh stoked. On the whole, therefore, it seems that a kerosene or paraffin oil-stove will be about the best thing to employ. As the type of dark room we have in mind is small, and the door is usually kept shut while working in it, an oil-stove, with, say, a four or four and a half-inch wick, will keep the room throughout the day at a comfortable working temperature. A common paraffin lamp, with an inch wick, left burning at night will also keep the chemicals always at a tolerably equable temperature, particularly if the dark room is in the basement of the house, and that is where so many amateurs' "dens" are situated. An objection to paraffin stoves may be raised, namely, that they "smell" while burning. When that is the case, in nine cases out of ten it is due to neglect—either the lamp and its fittings, on the outside in particular, are not kept clean, or the wicks are not kept in order. When these points are attended to there need be no offensive fumes given off from a well-constructed stove. If there are any, however, they will have no injurious effect on those exposed to them, nor will they have in any photographic process.

Combined Developers.

DR. LUPPO-CRAMER contributed a paper to the "Photographische Correspondenz" upon the question of mixing various reducing agents in the constitution of the developer. There is a prevalent opinion that a combination of metol and hydroquinone offers considerable advantages, and Dr. Lüppo-Cramer's experiments appear to confirm this. To a 50-gramme solution of anhydrous sulphite of soda in 1 litre of water, 15 grammes of metol, or hydroquinone, were added. The alkali was the usual 10 per cent. solution of potash. It was found that 25 c.c. of the metol solution, plus 25 c.c. of the hydroquinone, had greater developing power than 50 c.c. of metol alone, using the same amount of alkali, 50 c.c. in each case. Scarcely any difference in the result was found, even when the proportions were changed to 20 c.c. of metol to 30 c.c. of hydroquinone, but with 10 c.c. of metol to 40 c.c. of hydroquinone, a small falling off of energy was perceptible. As the power of metol as a developer is twice that of hydroquinone, it is evident that a combination of both possesses distinct advantages. The influence of bromide in the developer, for cases of over-exposure, was also tested; 10 c.c. of metol with 40 c.c. of hydroquinone were compared with 50 c.c. of hydroquinone alone, but in the latter case only 5 c.c. of a 10 per cent. solution of bromide of potassium were used, whilst 10 c.c. were added to the metol-hydroquinone. Notwithstanding the double quantity of bromide, the metol-hydroquinone had over-developed the plate by the time the image began to appear with hydroquinone alone. The plates were given about four times the normal exposure. Another series of experiments showed that the presence of bromide did not counteract the advantage of combining metol with hydroquinone. Normally exposed plates were developed with the following solutions:—

a.—50 c.c. metol+40 c.c. water+50 c.c. potash+10 c.c. bromide of potassium.

b.—10 c.c. metol+40 c.c. hydroquinone+50 c.c. potash+10 cc. bromide of potassium.

c.—50 c.c. hydroquinone+50 c.c. potash+5 c.c. bromide of potassium.

With a and b the image began to appear almost simultaneously after 20 seconds, but with c a minute and a-half elapsed before there was visible effect. b gained in strength more rapidly than a, and there was

considerable difference between them before traces of the image were seen with c. This shows that hydroquinone reacts in combination with metol, notwithstanding double the quantity of bromide, although it may not have sufficient energy to do so in the absence of metol. Other experiments were made with glycin, eikonogen, and pyrogallol.

Combining Negatives: Some of the Methods.

HERE is one we have seen successfully practised when only a single figure has to be introduced into, say, a negative of a group. The film of the second negative is first stripped from the glass by any of the well-known methods, and it goes without saying that it must be thoroughly hardened beforehand, either with formaline or chrome alum, to prevent its expansion when removed from the plate. The figure is then neatly cut out and laid on the negative, in the place it is to occupy in the picture, and then traced round with a needle-point. That portion of the negative is then carefully scraped away with a penknife, and the stripped film inserted in its place, and secured with two or three small touches of gum. If the juncture is not quite complete, it must be made good with Indian ink or other colour. When there are several figures to be introduced this method becomes a little tedious, therefore it is better to make an entirely new negative. This procedure has the advantage that the original negatives then remain intact, inasmuch as the combination is made in the transparencies from which it is produced. The first thing to do in this case is to make transparencies of the different negatives to be combined. These may be made by any method, but whichever is selected for the work, the transparencies must be as films. They may be printed by contact on dry-plates, and afterwards stripped from the glass, or they may be printed on celluloid films; or they may be made by the carbon process. By whatever process they are produced, it is obvious that they must all have the same printing density to obtain a satisfactory negative. Celluloid films will no doubt commend themselves to some as being the most convenient. In practice, however, it will be found that the celluloid is somewhat difficult to cut through, in the manner presently to be described, unless it be very thin. That objection, however, does not obtain with the stripped dry-plate film; but there is an objection to both these methods, in that the colour of the transparencies may not be the same in each, and, therefore, not have exactly the same printing value. It is for that reason that the carbon process is to be preferred, as with that the colour will be identical in each, and the printing density easily judged in the development. We will now consider the procedure by that method, and will take, by way of example, say, a group of a family, some of the members of which cannot be present at the time it is taken, and their portraits have to be introduced afterwards. In taking the group, it should be arranged so as to admit of the absent ones' portraits to be introduced in the desired positions. These portraits must, of course, be taken on the same scale as those in the group, and posed to suit the positions they are to occupy in the finished picture. The different negatives having been secured, transparencies are next made from them, and we will suppose that the carbon process is the one selected for the purpose. This is how we proceed. Glass plates are cleaned, and then treated with French chalk, or are waxed. They are then coated with thick enamel collodion, and after that has well set the plates are placed in water until the solvents are washed away. The exposed tissue is then squeezed upon them and developed in the ordinary way. When developed, and well drained, the transparencies are flowed over with a weak solution of gelatine; drained, and allowed to dry. They are then coated with enamel collodion, and again dried. When dry, they are stripped from the glass, and are then,

while being very thin, convenient for handling. The reason for the coating of gelatine is to protect the first film of collodion, in the highest lights of the picture, from the solvent action of the second coating. The transparencies being finished, the principal one is fastened securely by gum-paper round the edges to a glass plate. One of the others is then taken and superimposed upon it in the place it is to occupy, and held firmly while the outline of the figure or that portion that has to be introduced is cut round—cutting cleanly through both films at once with a sharp penknife, and then removing the under piece. In this way the second film will fit accurately into the first one, where it should be secured to the glass with a few small touches of gum. The other figures are then dealt with in a similar way, and the combination transparency is then complete. It only remains now to make a negative, or negatives, from it. Perhaps the best and simplest way is to print a carbon negative from it, or it may be copied in the camera on a dry-plate. Some, however, may prefer to make it by contact-printing on a dry-plate. In this case, however, the transparencies must be fixed on the glass the reverse way. In this article we have given sufficient details for combining negatives to enable anyone to adapt any of the methods described to his special requirements.

Double or Combination Printing.

THERE are several ways by which double printing can be carried out, all of which are good if ordinary care and a little skill be bestowed on the work. Two systems may be followed: one is to work by double printing on the paper; the other to reproduce the negative through a transparency in which the combination is made. If, say, only a few prints are required, the first-named system will involve the least trouble. But if a large number have to be done the other is the best, inasmuch as the prints are made at a single printing instead of at two or more. Combination printing may be done in two ways—masking and vignetting. The latter requires more skill and experience than the former, though, perhaps, on the whole, when skilfully done, it is the best. The one that is the most generally practised is the masking system. We will here briefly describe how it is followed.

Let us take, by way of illustration, a group of persons in which it is required to replace one or two faulty portraits by more satisfactory ones. Supposing we have two negatives of the same group—for it is very usual to take important groups in duplicate—in which some portraits are better in one than they are in the other, and it is required to get a satisfactory whole. By one plan we proceed to block out neatly with black varnish the faulty figures in the generally best negative, and all the other portions in the other one. When a print is made from this negative, of course, it will only have the figures it is desired to introduce on a white ground. This print is then accurately placed in position on the first negative, and printed in the ordinary way. If this be neatly done there should be no indication that the picture was printed from two negatives.

The plan followed by the majority of printers of the old school was not to block out with black varnish, but to make prints on thin paper and then carefully cut out the different figures, and fasten them by gum to the principal negative, using the other portion as a mask. These masks, when cut out, it may be mentioned, were exposed to light to blacken the paper before it was affixed to the negatives. In cutting out the masks, or in blocking out with the black varnish, it is better to err on the side of a slight over rather than under lapping, as then, if a light edge results, it may the better be touched out when the picture is finished. If, however, the work is neatly done no retouching will be required. It goes without saying that the two printings must be carried to exactly the

same depth, otherwise the introduced figures will not harmonise with the others.

Of course, a figure that was not included in the group when taken can, in the same way, be introduced. What we have to do in this case is to take a print from a negative of this person on paper, preferably a little larger than the original negative, and cut out the figure and fix it in position on it. The counterpart is then stuck on the small one, and a print made from it, which, of course, is the figure only on white paper. This print is then arranged on the large negative so that the figure is covered by the mask on it, and then printed.

Here is another way by which a single figure may be introduced, which is very simple, and for which reason it may commend itself to some. The background of the figure to be introduced is blocked out, either with a paper mask or with black varnish, and the figure printed on paper of suitable size. The printed figure is then neatly painted over with gamboge, which is allowed to dry. The print is then put upon the group negative—the already printed figure being arranged in the position it is to occupy—and printed in the ordinary manner. In this second printing the gamboge protects the printed figure from further action of light. When the silver is washed out of the paper, prior to toning, the gamboge is washed away at the same time, leaving the print intact and ready for toning. This method, it may be mentioned, is an adaptation of that published many years ago by Mr. Edge for introducing natural backgrounds in portraits taken in the studio. In this method either albumen or collodion paper should be employed, as the gamboge would be liable to leave a stain on a gelatine paper. A very important point in connection with double printing must be observed, namely, to keep the paper in the same hygroscopic condition in the two, or more, printings, otherwise accurate registration will be an impossibility. Above we alluded to combining negatives so as to obtain the pictures at one printing, but for want of space that cannot be dealt with in this article.

Dusting-on Process as applied to the Intensification of Negatives.

It will be remembered that in "Ex Cathedra" last week, when speaking of the dusting-on process, we referred to the use that may be made of it for the intensification, locally or otherwise, of thin and weak negatives, and mentioned that in some respects it offers advantages over chemical methods of accomplishing the same end. Since the article appeared two or three correspondents have expressed regret that, while speaking so favourably of the method, we did not give the details of the process, so that our younger readers might, at least, give it a trial. Hence the present article. It may be as well to explain to our newer readers that the powder process is based upon the hygroscopic condition of a film which may be one of gum-arabic, dextrine, albumen, with glucose, honey, sugar, glycerine, etc.; the number of substances that may be utilised is very wide indeed. If we coat a glass plate with either of the mixtures, according to the formulæ given on page 1091 of the ALMANAC, or several others that might be given, and dry it before the fire, the coating will be hard and firm at first. But after it has become cold, and it is exposed for a short time to the air, according to its humidity, it will become more or less "tacky," when any fine powder rubbed over it will be found to readily adhere. But if, after the plate has been dried, it be exposed for a few minutes to good daylight it will not become "tacky" as before, and the powder will not "take." The action of the light has been to destroy the property of becoming "tacky." Now from this it will be seen that if we desire to make a positive by the powder process we must use a positive—a transparency—as a *cliché*, and if a negative, we must employ a negative,

and this makes the process a very suitable one for our present purpose. What we really do is to supplement the negative with another one on its face—wholly or partially, according as to whether the powder is applied uniformly all over or only locally. Furthermore, and what is an additional advantage, whether a positive or negative be used for producing the picture, it is desirable that it should be of a thin and not of a vigorous character in order to obtain the most satisfactory results.

As we have just said, great variation may be made in the formulæ employed. The one numbered 2 in the ALMANAC is a good one to be employed at this season of the year. It stands thus:—

Dextrine	$\frac{1}{2}$	an ounce, or 5 grammes.
Grape sugar	$\frac{1}{2}$	" " " 5 "
Bichromate of ammonia.....	$\frac{1}{2}$	" " " 5 "
Water	10	ounces or 100 c.c.

It is convenient to mix the dextrine and grape sugar in half the water, and the bichromate in the other half, and then keep the two solutions separate as stock solutions. They are then mixed in equal proportions as required for use, and filtered. After keeping a week or so the dextrine and glucose solution may show a sign of mouldiness on the surface, unless an antiseptic has been added, but this appears to do no harm when the mixed solutions have been filtered.

The negative to be intensified should be varnished, and it will be well, as a further protection, to give it a coating of collodion before the varnish is applied. The negative is now flowed over, as collodion is applied, with the bichromated mixture, in a room with subdued light, drained and dried, either before the fire or over a spirit lamp. The heat should first be applied to the corner opposite to that from which the mixture was drained off, so that an even coating may be secured. The plate, still warm, is now laid, face downward, on another warm glass and exposed from the back to daylight for a few minutes. It is then taken into the room and again warmed to drive off any moisture it may have absorbed during the exposure. After the plate has cooled, and rested a minute or two, a little powder of any colour that may be desired is applied, sparingly at first, so "as to feel one's way," with a camel-hair brush, with a somewhat swishing motion. Whatever powder be selected, it is essential that it be in the finest possible state of division. If plumbago be used, and on the whole that is the best for our present purpose, that known as electrotyping plumbago should be employed. In a few minutes—according to the hygroscopic condition of the atmosphere—the powder will begin to "take" where the denser portions of the negative have protected the film from light, and afterwards to the less denser parts in proportion, while, if the exposure has been, approximately, correctly timed, none at all will attach itself to the deepest shadow of the negative.

Should it be found that, after a few minutes, the powder does not "take," simply brush it off and allow the plate to rest for a few minutes longer to take up more moisture from the atmosphere, and then re-apply the powder. If then it does not adhere it is probable that the exposure to light has been too long. The plate, however, may still be utilised by putting it for a short time in a damp cellar, or by gently breathing upon it, though the former is the preferable procedure. If, on the other hand, it is found that the powder takes too freely, it shows that the action of light was insufficient, or that too much of the hygroscopic material was used in the mixture for the existing state of the atmosphere. In this case the plate must be at once warmed and the development re-commenced directly it has cooled. In abnormally dry weather a mere trace of glycerine may, with advantage, be added to the bichromated mixture, but it

must be used with judgment, as a very little of it goes a long way in the powder process. When sufficient density has been obtained the plate must be exposed to light for a time—half-an-hour or so, or less to sunshine. This will render the whole of the film insoluble and non-absorbent. If it is found that sufficient density has not been secured, the negative, after sunning, may be re-coated with the bichromatic mixture, and the operations repeated again and again. In this way, with care, any amount of density may be obtained with even the feeblest of negatives. Instead of applying the bichromated dextrine to the face of the negative it may be applied to the back, and sometimes with advantage, and if vertical light be used for the exposure the image on the back will be, practically, as sharp as if it were on the front. It is obvious that the powder can, with a fine camel-hair brush, be applied locally to any parts of the negative, and withheld from others, so as to emphasise the intensification where required. The contrasts can also be enhanced by gently breathing through a small tube of paper upon those parts, so as to slightly add to the moisture locally, though this must be done with some care. It will not be found necessary to further treat the plate after the film has been finally fixed by light, as the very slight tint given by the bichromate makes no material difference in the time of printing. There is one thing we may direct attention to, which is that the plumbago gives a really greater printing density than appears to the eye, so that it is necessary that this fact should be kept in mind while working.

Flashlight Portraiture without Apparatus.

THE professional photographer is frequently called upon to take a photograph at his client's home under very difficult conditions. Possibly he has been sent for to take some interior and exterior photographs, and is then asked to take a portrait, or even a group, in a very dull room liberally hung with heavy curtains. He does not like to refuse, and as he cannot carry his heavy flashlight apparatus on every outdoor job, he is in a quandary. I find it is best to be prepared for such emergencies, especially when one can put all that is necessary in a coat pocket. All I take is a few sheets of tissue paper, a small pot of paste, and one or two boxes of "Flashaxe" Flashlight candles. These I use as follows: The candles are placed on a piece of metal (a shovel will do) slightly behind, but about 2ft. above the camera. Various effects of lighting can be obtained by altering the angle at which the light will strike the sitter. With a lens working at F6 and a rapid plate, one candle is sufficient for a single figure or two or three a little distance apart, and a little higher up for a group of four to six figures. You now take the sheets of tissue paper and the paste, and borrow a small rod or cane about 6ft. in length. Paste the sheets of paper together, so as to make one large sheet about 6ft. square, and fix one end to the rod. This screen of tissue paper your assistant can stand on a box and hold in front of the light. Then when all is ready and the picture is focussed, light the candles with a taper, and while doing so open the shutter. I generally use two-second candles and put the cap on the lens or close the shutter just before the candles go out, as this lessens the risk of the sitter moving.

The candles can be used either for portraiture at night or to assist the daylight when taking photos in a badly lit room in the daytime. They are also most useful when taking interiors to light up any dark corners. One of them placed so as to throw its light on the part desired, with a small shade behind it, to prevent the light striking back into the lens, will frequently improve the resulting negative considerably, as well as enabling the operator to give a much shorter exposure for the remainder of the interior. Expose for the lights, and rely on the Flashaxe candles

to lighten the heavy shadows. No doubt these few hints can be greatly varied and improved on in practice, but I hope I have made myself sufficiently clear to enable anyone who has not already used these candles to give them a trial.

WILFRED EMERY.

Glass Positives: Repairing and Copying.

It not infrequently happens that photographers are, in the ordinary course of business, called upon to copy or to produce enlargements from some of these old pictures, or, maybe, to repair them if damaged. Often those who are called upon to do this know nothing of the practical details of the process by which they were made, and are sometimes at a loss as to how to proceed. If the picture is a good one, and in good condition, a glass positive is the easiest thing in the world to copy. But it is when it is inferior, or damaged, that the trouble comes into those who are not familiar with the working of the process itself. A glass positive, it may be mentioned, is, practically, a very thin negative backed with some black or dark material, such as velvet or black varnish. Sometimes this backing was applied direct to the collodion surface, and sometimes to the back of the glass. In the former case the image would be non-reversed as regards right and left, and in the latter it would be reversed, as in the case of a Daguerreotype. When the black varnish was applied directly to the film it, to an extent, degraded the whites of the picture. It was usual, when the backing was on the glass side, to varnish the picture with a colourless dammar varnish, but this was not always done, and as a consequence the picture, if air had access to it, became tarnished, as is the case with Daguerreotypes. Theoretically, the tarnish might be removed, as with Daguerreotypes, but we would not recommend a novice to attempt the work, for the probability is that the picture would be ruined, inasmuch as by the exposure the collodion film, to an extent, will have become decomposed, and, if not, it would probably come entirely away from the glass when wetted. Such a picture, if copied in the ordinary way, would yield but a very poor result; but, still, as a rule, good results may be obtainable from it by those who know the way.

As we have just said, a glass positive is actually a thin negative, and in a case like that under consideration it will be best dealt with as such. The first thing to do is to entirely remove the black varnish, either by scraping it off or by wiping it off with a pledger of cotton-wool charged with benzol. As the collodion film is not varnished, and it might now be dangerous to varnish it, it would certainly be damaged if it were attempted to be printed from in the ordinary way. Therefore, it must be dealt with in the copying camera, either by making a transparency and from that a negative, or a bromide enlargement may be made direct from it, the thin image rather lending itself to that method. Sometimes the picture, as a positive, is bad, the image being grey and lacking in contrasts. Now it generally happens that the worse a picture is as a positive the better it is as a negative, and so much to the advantage of the photographer who has to reproduce it. Frequently, when the film is marked or stained, the stains, which would be very manifest if copied in the ordinary way, do not show at all by transmitted light. When this is the case the reproduction may, with care, be made even superior to the original.

It occasionally happens that a photographer has a positive brought to him to be copied in which the black varnish has cracked, showing map-like markings and, in some instances, leaving the glass in flakes—a very common occurrence with some of the earliest black varnishes that were used. Now, of course, all that has to be done is to remove the old varnish and replace it by new, when the picture will be as good as new.

One would imagine that this simple treatment would occur to everyone, but apparently it does not, for some months back we received a positive in this state from a correspondent—a professional photographer, by the way—asking if there was any known method of “restoring” it. If the black varnish has been applied to the collodion film, and has cracked in the way described, the case is a more difficult one to deal with—sometimes impossible to do so successfully. However, if the case is not a very bad one, it may often be repaired in the following way:—The back of the plate is first fumed with ether for, say, half an hour or so, to soften the edges of the collodion at the fissures, and after that submitting it to the fumes of benzol for an hour or more. This will sometimes so soften the varnish as to fill up the cracks, when a fresh coating may be applied. But, as we have just intimated, the treatment is not always effectual; and, as a word of caution, we may add that we should not recommend anyone who is not conversant with the working of the collodion process to attempt the work for the first time with a picture upon which any value is set by its owners.

Glycerine in the Platinum Process.

In a paper read by Raimund Rapp before the Photographic Society of Vienna he described to the members his method of controlling development, and, as a successful worker, his procedure may not be without interest to our readers. The equipment consists merely of four or five flat and round brushes, three dishes, glycerine, a solution of oxalate of potash, and some dilute hydrochloric acid. The first dish is filled with glycerine, the second with a solution of oxalate of potash (1 in 3), and the third with a similar solution diluted to half strength. The prints should be made upon cold bath paper, and rather over-printed. For development, place the prints upon a sheet of blotting-paper, fastened to a drawing-board, and brush them over with glycerine evenly. Remove any excess of glycerine by means of a brush, and blot the print with filter paper. The solution of oxalate of potash is then applied by means of the brushes. The dilute solution should be used first. The concentrated solution may then be applied as circumstances dictate either to the whole print or locally, by means of the smaller brushes. If it is desired to retard the development of any portion of the print, this may be done by painting it with glycerine. When finished, transfer the print to a fixing bath of dilute hydrochloric acid, and finally wash.

Lantern Slides.

THE writer was printing a lantern slide for a competition from a negative taken on a dull day, which gave a clear, sharp positive without any shadows. Instead of printing the clouds to meet the outline of the landscape, he printed a mottled sky on the cover glass extending over at least half the landscape. As a result there appeared on the picture a number of shadows, really clouds, which seemed to be the shadows cast by the clouds, greatly improving the picture and materially helping to win the competition. Perhaps the hint may be useful to others.

THOMAS ALLISON.

Wanganui, New Zealand.

Light Filters for Colour Photography.

Dr. George Lindsay Johnson, who, on the occasion of Sir William Abney's lecture, promised to communicate to the “Journal” of the Camera Club the results of an exhaustive series of experiments recently made in Vienna to determine the best media for light filters for use in colour

photography, sent the following note upon the subject to the "Camera Club Journal":—

For coloured process work and for photography in colours, glass slides, coated with collodion or gelatine films, stained with aniline dyes, will enable one to get more perfect colours for such purposes than coloured glass. But even better still are glass troughs, consisting of two parallel sides of thin plate glass cemented on to thick pieces at the sides and bottom, and having their faces separated by about 3 mm. to 5 mm. interval. This, filled with a filtered aqueous solution of the selected aniline dye, will give a very perfect colour-corrected screen.

The dyes found most suitable are:—

For the yellow negative, *i.e.*, for the negative which will produce the block or print to receive the yellow colour, an aqueous solution of marina blue.

For the red negative, acid green "Grünsaure," aurantia aqueous solution of each, equal parts.

For the blue negative, acid fuchsine, "Säurefuchsin," aurantia, equal parts.

As regards the plates used, for taking red colours, the Warwick plate is to be recommended. For blue colours, Lumière's special spectrum plate. For the yellow colours an ordinary non-orthochromatic plate gives good results. But Edward's, Cadett's, Lumière's, and the Ilford orthochromatic plates are also to be recommended for special kinds of work, but as a general rule the first-named plates will give the best and most uniform results.

The stains above named may be had in powder or in solution from Grüber and Hollborn, 63, Baierischestrasse, Leipzig; London agent, C. Baker, 244, High Holborn. The glass troughs from Zeiss and Co., Jena, or from Baker, or Townsend and Mercer, Bishopsgate Street, E.C.; Squire, chemist, Oxford Street; and Martindale, New Cavendish Street, also keep excellent stains, and are very well informed, as they both make stains a speciality.

Making Enlarged Negatives in Two Stages.

WITH the increase of small cameras, writes Mr. C. Ray Woods, enlarging is an operation more resorted to than ever, nor is the practice likely to decrease. The method by which it is accomplished varies according to the extent of enlargement required, the number of copies wanted, and the taste of the operator or of his customer. The presence or absence of grain in the resulting picture is a matter of some moment. In large work of the portrait class a certain amount of grain is desired and obtained by various means; but it will, I think, be admitted that in most cases a sharp negative is wanted, to begin with, and from that as sharp an enlargement as the original will allow. In scientific work, of course, there is no room for debate—in all cases the sharpest thing attainable is desired; and where a very small picture is desired to be brought out with very considerable magnification, pictorial work also demands that the result should not show much fuzziness or even grain. Many of the subjects produced by instruments of the moving-picture type will become of historical value, not merely as moving pictures, but for details of historical interest; out of the many hundreds of minute pictures depicting a ceremony, there may be one or more amongst the large choice of them which it may be desired to have reproduced on a large scale. In such a case the avoidance of grain in the final result may be a desideratum. Where the enlargement is made direct from the small negative, the grain in the original may be made most painfully apparent. To lessen this, the

enlargement may be carried from step to step; but this, again, if the steps are many, may bring deterioration in its train. For scientific work and for enlarging to many diameters it will not, I think, be disputed that the most satisfactory method is to make an enlarged positive, and from that an enlarged negative, the positive being the exact medium in size between the original negative and the enlarged negative from which prints to any number are to be obtained. Further—if the positives are made in the enlarging camera of the exact proportionally intermediate size, the adjustments of the distances of picture, lens, and ground glass are made once and for all. Thus, if a series of negatives are to be enlarged four diameters, the first stage will be to get enlarged positives of two diameters, and the second stage will be to put these in place of the original negative, and, without making any alterations in the camera, to proceed with the preparation of the enlarged negatives. The instance here given, that of four diameters, is a simple one. An equally simple instance would be that of nine diameters, for in this case the enlarging would be three times at each stage. The next simple instance would be sixteen diameters or four times four. The next would be twenty-five, or five times five; the next, if it were desirable to enlarge so much, would be six times six, and so on. Such work, however, would seldom be confined to these very simple instances. Forgive me if I am wrong in saying that the average operator would be at a loss to proceed if the work was required to be done with exactitude; certainly the slide-rule is not an accessory of the ordinary studio, and even the scientific operator might prefer the handy compass and set-square, giving as it does, in a simple way, a practical scale readily obtained when once the principle is grasped. And here I may tell my superior critic, who may say that I am only peddling Euclid, I., 47, that, as he can take care of himself, it is not for him that I am writing.

To obtain a negative twice the diameter of the original in two stages is very simple. For all practical purposes, of course, enlargements of a few diameters only are as good when made from a contact transparency, but the obtaining of negatives of two or three diameters is the foundation of a whole series. Take two points on the original negative, and draw on a sheet of paper a square with this distance as side; the diagonal of the square will give the distance apart the two points should appear on the ground glass for the transparency; when the enlarged transparency is put in place of the original negative, the resulting enlarged negative should be exactly twice the diameter of the original, no re-focussing or re-measuring being required. Here at each operation we multiply by the square of two. To enlarge three times diameters in two operations, the quantity required is the square root of three. To obtain this in practice it is only necessary to draw an equilateral triangle the side of which is twice the length of the two points chosen, and from one of the angles drop a perpendicular to the opposite side; this perpendicular represents the distance apart the two points should appear on the screen for the first operation. The most convenient way in practice, in this case, is to cut the figure out on paper and fold across, as may be done in the preceding and following cases, using the paper scale thus obtained for setting the camera. The scale of four diameters, as previously hinted, presents no difficulties, as the square root of four is two. Five is obtained by setting off one distance at a right angle to a line measuring two distances; the line completing the triangle gives the scale required. To obtain six diameters it is first necessary to obtain the square root of two, as in the first instance, set this off at a right angle to a distance of two and complete the triangle for our required scale. Seven in like manner is obtained by

setting off the square root of three, as obtained in the second case given, at right angles to a distance of two. The most convenient way of getting the scale for eight is not by combining the square roots of three and five, but by taking the diagonal of a square whose side measures two. From this point most of the scales may be obtained in more than one way. The most convenient and simplest are here given. Nine presenting no difficulties we get:—Ten.—A line joining co-ordinates of one and three. Eleven.—The co-ordinates are the square root of two at right angles to three distances. Twelve.—Three distances and the square root of three. Thirteen.—Two distances and three distances. Fourteen.—Three distances and the square root of five, obtained as already shown. Fifteen.—The square roots of ten and five appear the simplest. Seventeen.—One distance and four distances.

It is needless to proceed further, for anyone who has followed me thus far will have already grasped the principle. Nor should I have written this much on the subject, but this simple and practical application of a geometrical proposition did not appear so self-evident, even to some to whom the proposition itself was A B C. I trust that I have made it sufficiently clear, although endeavouring to avoid diagrams which, unless really necessary, only, in such a matter as this, tend to scare away those whom one is most anxious to assist. The only question that can be raised against the usefulness of this little essay is: Is it desirable to make the positive intermediate in size between the original and the enlarged negative? This will depend, of course, as already hinted, on the size of the original and the grain of the deposit. The actual operator must decide that question from the subject he has to deal with. If the avoidance, as much as possible, of enlargement of the grain is at all a matter of moment, the method discussed here is the best and simplest: firstly, because the strictly proportional increase in the size must give the least granular appearance; secondly and chiefly, because only the one operation is required for the adjustment of the distances of negative (or positive in the second stage of the process) lens and ground glass.

Metallic and Other Spots on P.O.P. Prints.

FREQUENTLY in the correspondence columns of the *British Journal* the question is asked of the editor the cause of spotty P. O. P. prints. There are many ways to account for this: contamination of the water with iron, for instance. Another cause, where P. O. P. prints are cut circle before toning with a circular knife, and a zinc templet is small particles of zinc getting on the prints, which, on coming into contact with the washing water, causes spots. During last summer my printer was very much troubled with spots on the prints, which intensified very much on drying, and appeared as if a quantity of pepper had been shaken over them. These spots did not appear till the prints had been fixed. As he could not account in any way for these spots, I took the matter in hand, feeling sure that it was not the paper at fault, which was a good brand. I tried rain-water instead of tap-water; result, spots. I then omitted the alum bath; result, the same. Then I bought some paper locally, without effect, thinking the hypo was at fault. I bought a fresh sample and tried, with no better result; in fact, I tried everything I could, without success. It then occurred to me to examine the jar of hypo in use. I then found the measure he was using—a wooden one—had a band of tin round the bottom, which had got very rusty, contaminating the hypo with iron. I then used fresh hypo and new measure; result, spots disappeared. Moral: Do not condemn the paper till you are sure it is not the chemicals or faulty manipulation.

J. H. SMITH.

Mounting Prints.

EVERY photographer must be familiar with the unpleasant effect produced by the expansion of the paper upon which a print is made. The face of a sitter may be distorted in length or breadth according to the direction in which the paper is cut. To meet this difficulty, a French firm, Messieurs Derepas frères, demonstrated at the Société Française de Photographie a new system of mounting prints in the dry state. Instead of pasting the prints directly upon the mount, a pellicular interleaf of adhesive material is introduced between the print and the mount, and the photograph is then made to adhere by pressure under heat. It is claimed that the prints retain their exact original size, that the print is completely isolated from the mount, and that the print remains perfectly flat, whether the mount be thin or thick. These are very decided advantages if the nature of the adhesive material is such that it remains unaffected by time. We remember the india-rubber mountant, which was very attractive, but useless, because it so soon perished. It is not reported how the pressure and heat are applied, nor of what the pellicular interleaf is made, but as the article is to be placed upon the market, we expect it will soon be on sale. If the price is moderate and the apparatus cheap and efficient, there should be a good demand on the part of amateurs, to whom the present system of wet mounting is a source of vexation.

Photographing Live Fish.

A FEW interesting notes upon this subject were given by Dr. E. Bade, of Berlin, in the "Amateur Photograph." Fish are very rapid in their movements, and even when they appear to be still, closer examination will show that their fins are in constant motion. A very quick-acting shutter is therefore a necessity, but the absorption of light by the water, and the glass sides of the aquarium, impose a limit. The lens should be a rapid one, and used at full aperture. It might be supposed that a small aquarium would be best for the purpose, but Dr. Bade has found that a large aquarium is much better. Particular attention should be given to the quality of the glass forming the sides. We well remember the difficulties experienced by a noted photographer, who attempted some years ago to make some aquarium photographs. Probably his failure was due to the glass of the aquarium not being homogeneous. The exposure should be made in direct sunlight, if possible, and the lens focussed for a particular spot. The photographer must then patiently wait until the fish obliges him by taking up the correct position. We need scarcely add that small negatives for subsequent enlargement will save the photographer a large percentage of failures.

P.O.P.

Very often one sees in the column, Answers to Correspondents, in BRITISH JOURNAL OF PHOTOGRAPHY, such queries as how to prevent P.O.P. prints sticking to plate glass, after squeegeeing, which, to say the least, at all times is very annoying. Here are some of the causes, and prevention is obvious.

1. Do not allow P.O. prints to soak too long, but wash them in a rotary bath, keeping the prints moving, and changing their position every second; half an hour I find ample.
2. Use ferrotype, or, better still, sheet of vulcanite thoroughly well cleaned and dusted over with real steatite, or French chalk, *not* whiting. Then polish with clean and well-worn duster.
3. If plate glass is used after cleaning from thumb marks, etc.,

polish with French chalk, dust off; now light rub over surface glass a small sponge.

GEO. W. VALENTINE.

There is a good, safe light to work by in dark room, once used; then good-bye to ruby glass, canary medium, paper, etc.

Either bromides, lantern slides, plates, films, paper, etc., etc., can be developed without the slightest fear of fog. Changing plates or loading slides can be accomplished without fear.

Preparing Cracked and Broken Negatives.

In the "Bulletin de la Société Française" Monsieur H. Reeb describes the means by which the repair of a cracked or broken negative may be considerably facilitated. Take an old negative, or, preferably, an undeveloped fixed plate, and soak it slightly in water, so that the gelatine is only partly swelled. The cracked or broken negative should be placed upon this, with its back to the gelatine, and gently but firmly pressed down. By the swelling of the gelatine the air is excluded, and the two plates become firmly attached to each other. If an old negative has been used as support, the broken negative must be coated with enamel collodion, and stripped in the usual way, but in the case of a cracked negative mounted upon an unexposed, fixed plate, stripping is not a necessity.

Reduction and Intensification.

PROFESSOR LAINER has recommended iodide of potassium and hyposulphite of soda as a reducer where very slow action is required. To 100 parts of a 25 per cent. solution of hyposulphite of soda add one part of iodide of potassium. The reduction proceeds very slowly indeed, without loss of detail. A perceptible difference may be seen in about an hour, and if immersion in the bath be prolonged for eight or ten hours extremely foggy negatives may be cleared. The gelatine is not attacked, but slightly hardened by this bath. Those who wish to obtain a very dense negative with mercuric chloride may do so by immersing the plate, after it has been bleached, in the following solution:—

Water	100 grammes.
Sulphocyanide of ammonium	3 grammes.
Chloride of gold (1 per cent. solution)	10 c.cm.

The film intensifies evenly through shades of brown to violet black. The bath must be allowed to stand for half an hour before use, and it may be kept for several days. This process is taken from the "Allgemeine Photographen Zeitung."

Ruby Glass: A Good Substitute for.

Of late years several lamps have been put on the market in which the place of the ruby glass has been taken by a trough filled with a liquid, generally a saturated solution of potass bichromate.

While this is a permanent liquid so far as colour goes, the disadvantages of it are that it is very corrosive, and the light transmitted, extending into the greenish-yellow, is not always safe for ordinary plates, and absolutely unsafe for isochromatics.

A better solution is one of aniline dyes, and for the purpose one containing one-twentieth (1-20th) per cent. of eosin (blue shade) and one-tenth (1-10th) per cent. of tartrazin is exceedingly safe, even for isochromatic

plates. This strength is calculated for a lin. thickness of solution; for other thicknesses the strength will be in inverse proportion.

Those who have not a lamp with the trough may make a very good light filter by fixing and washing two undeveloped dry plates (light-struck or other spoiled plates may be used). These when dry are cut down to the size of the lamp glass and soaked, one in a 5 per cent. solution of blue shade eosin, and the other in a 1 per cent. solution of tartrazin, till they will take up no more; dried without washing, and when dry placed film to film and bound round the edges with a gummed strip of paper like a lantern-slide. Far more light passes through this than ruby glass, and yet at the same time it is much safer. Isochromatic plates (not red-sensitive) have been developed close up to the lamp without a cover and without showing signs of fog. Both the solution and the stained plates will require renewing once a year if used for artificial light, as they gradually bleach and become unsafe. If used for daylight (not recommended) they will require it much oftener, as this light bleaches them very rapidly. The dyes mentioned may be obtained in small quantities from Messrs. Mawson and Swan.

T. W. DERRINGTON.

Sepia Platinotypes by Cold Development.

BARON VON HUBL, whose name is well known in association with this most beautiful and permanent printing process, gave the following instructions in the "Photographisches Correspondenz" for the production of sepia tones. The feature of the process consists in using a citrate of mercury, instead of bichloride. Take a gramme of yellow oxide of mercury and 5 grammes of citric acid, add 20 c.c. of water, and dissolve by heat. Filter the colourless fluid. This is kept as a stock solution for addition to the sensitising bath. The paper should be prepared with arrowroot, and sensitised with

- 8 c.c. of normal iron solution,
- 4 c.c. of platinum solution, 1 in 6,
- 1 to 4 c.c. of citrate of mercury solution.

The addition of a little citrate or oxalate of ammonium will keep the high lights pure, and the gradation may be modified by adding sodium chloro-platinite, or bichromate of potash. The paper should be sensitised in the usual manner. The developer should be strongly acidulated with oxalic acid, and the strength of the solution of oxalate of potash may vary between 12½ to 25 per cent. The formula may be stated as follows:—

Water	1,000 c.c.
Neutral oxalate of potash	120 to 250 grammes.
Oxalic acid	10 grammes.

The development may take place in a dish in the ordinary way, or a brush may be used. The prints must, however, be at least five minutes in contact with the developer to effect complete reduction, otherwise they will lose considerably in the fixing bath, which should be a 1 per cent. solution of hydrochloric acid. Leave the prints for half an hour in the fixing bath, and then wash thoroughly. The colour and gradation of the image may be modified considerably by the composition of the sensitising solution, the developer, and the peculiarities of the paper used. In Baron von Hubl's work, "Der Platinruck," the normal iron solution is given as composed of 20 per cent. of ferric oxalate to each 100 c.c., of which 1 to 2 grammes of crystallised oxalic acid are added.

Some Toning Baths.

A very interesting series of experiments, of great importance to amateur and professional photographers, were made by Herr Franz Novak, of the Vienna Technical School. By desire of Dr. Eder, he has made a quantitative analysis of the amount of gold and silver contained in prints upon albumen and collodion paper toned with the following baths:—

Borax Bath—500 c.c. of a 2 per cent. solution of acetate of soda.

100 c.c. of a 1 per cent. solution of borax.

12 c.c. of a 2 per cent. solution of chloride of gold.

Sulpho-cyanide Bath A—1,000 c.c. distilled water.

40 grammes fused acetate of soda.

B—250 c.c. distilled water.

5 grammes sulpho-cyanide of ammonium.

For use, 100 c.c. each of A and B, with addition of 5 c.c. of a 1 per cent. solution of chloride of gold.

Combined Bath—1,000 c.c. water.

200 grammes hyposulphite of soda.

10 grammes nitrate of lead.

For use, add 5 c.c. of a 1 per cent. solution of gold to 100 c.c. of toning bath.

50 landscape prints, 13 by 18 c., were used in each instance, and by way of comparison, light and heavily toned sets were made. The light were toned to the brownish purple, and the heavy to the usual blue-violet stage. The following tabulated results are published with the paper in the *Photographisches Correspondenz*:—

Paper.	Gold | Silver		Relative proportion of gold to silver.
	Milligrammes		
	per square metre.		
Albumen lightly toned with borax bath.....	24.9	123.5	1 : 4.96
" heavily " " " " " " " " " " " "	28.0	122.0	1 : 4.3
Smooth celloidin A. lightly toned with sulpho-cyanide bath	58.1	49.1	1 : 0.84
" " B. " " " " " " " " " "	30.3	97.8	1 : 3.2
" " A. heavily " " " " " " " " " "	122.2	31.2	1 : 0.25
" " B. " " " " " " " " " "	89.7	76.9	1 : 0.85
" " A. lightly " " " combined bath.....	25.2	80.3	1 : 3.18
" " B. " " " " " " " " " "	28.6	134.6	1 : 4.7
" " A. heavily " " " " " " " " " "	37.6	43.1	1 : 1.14
" " B. " " " " " " " " " "	42.7	85.4	1 : 2.0

The celloidin papers A. and B. were bought of different Viennese manufacturers. Herr Novak remarks that the amount of gold taken up depends in the first place upon the nature of the sensitive film. For instance, celloidin requires more gold for a given tone than albumen. At the same time, the less the quantity of silver in the print, the greater is the quantity of gold. The nature of the toning bath also has an influence upon the quantity of gold requisite to obtain a given tone, and it will be seen that the sulpho-cyanide bath involves the use of more gold than the combined bath. If the stability of a print depends upon the amount of gold it

contains, then manufacturers are right in recommending the use of the sulpho-cyanide bath. It would have been very interesting had a set of gelatine prints also been included in the series of experiments.

The Control of Development.

THE following experiments, which were given in an article by Karl Schaum and Wilhelm Braun in the "Photographische Mitteilungen," show that the addition of potassium chloride and potassium iodide have considerable effect, in opposite directions, upon the development of silver bromide and silver iodide. A number of bromide plates were cut into strips and exposed in the Scheiner sensitometer. This instrument is a copy of the rotary disc, with graduated apertures, used by Hurter and Driffield in their experiments concerning the speed of plates. The exposure given was 15 seconds at 25 c.m. from the standard light, and all the strips of one series were developed simultaneously in the same vessel for the same length of time with 10 cc. of a one in three solution of sulphate of iron and 30 c.c. of a one in three solution of potassium oxalate, acidified. The temperature of the developer was 16° C., and the period of development four minutes. The following table gives the results in degrees of the Scheiner sensitometer:—

Number of drops added to the										
developer	0	10	20	30	40	50	60	70	80	
Water, without addition of haloid...	13	13	13	13	13	12	12	12	12	
Chloride of potassium	13	15	15	15	15	14	14	14	14	
Bromide of potassium	13	10	10	8	6	5	4	1	0	
Iodide of potassium	13	10	10	8	5	0	0	0	0	

From this it will be seen that chloride of potassium acts as an accelerator, whilst iodide of potassium is a more potent restrainer even than bromide of potassium. But the addition of iodide of potassium prolongs very considerably the time requisite to fix the plate. Instead of five minutes, two to three hours were found necessary. This is due to the conversion at the surface of the plate of the bromide to iodide of silver.

A similar series of experiments was made with chloride plates, with the exception that the developer was reduced to half strength and the exposure increased to two and a-quarter minutes at 10 c.m. distance from the standard light. The following are the results:—

Numbers of drops added to the										
developer	0	10	20	30	40	50	60	70	80	100
Water, without addition of										
haloid	10	—	—	10	—	—	9	—	—	9
Chloride of potassium	10	10	10	10	10	11	11	11	11	—
Bromide of potassium	10	5	4	4	0	0	0	0	0	—
Iodide of potassium	10	50	0	0	0	0	0	0	0	—

In this case chloride of potassium also appears to have a slight accelerating action when used in quantity, but it is attended by a yellowish veil. The clearest plates were those developed with iodide of potassium, but the fixing again proceeded very slowly.

The Dark-Room Bench.

In too many cases we are afraid the dark-room bench is anything but what it ought to be, and we have found it ere now moist with developer stains, which too readily adhere to the hands or the bottoms of measures, and even sometimes we have seen a fine crop of hypo crystals showing. If covered with linoleum, they are for a time decent in appearance, but the damp and the alkaline solutions soon attack the structure of the linoleum, and it will rub up to a fine powder, which has a happy knack of adhering to everything. Zinc is readily attacked by spilt fixing solution, and soon becomes riddled with holes. Lead is the only satisfactory

metal to use as a covering, but any metal is apt to try the strength of dishes and measures. Common paint, or even bath enamel, will not stand repeated and long soakings with alkaline splashes. M. Clerc, in "La Photographie Française," one of the best of our French contemporaries, now states that, having experimented for several years in the chemical laboratories of the Faculté des Sciences de Paris, he has finally adopted the following treatment with every satisfaction; the following solutions must be prepared:—

A.	
Sulphate of copper	125 g.
Chlorate of potash	75 g.
Bichromate of potash	50 g.
Water to	1,000 c.c.

B.	
Aniline hydrochloride	150 g.
Water to	1,000 c.c.

The solutions should be heated to boiling point, and A. is liberally brushed over the bench and allowed to dry, and then B. is applied and allowed to dry. A crop of crystals will appear as soon as the wood is dry, and these must be brushed off, and again successive coats of A. and B. applied as before. This treatment gives a deep greenish colouration to the wood, and if treated with boiled linseed oil or a thick paste of hard paraffin and vaseline, it will be quite impervious to water. The whole operation will only take about four hours, and it should be left for this time to dry thoroughly before use.

Toning P.O.P.

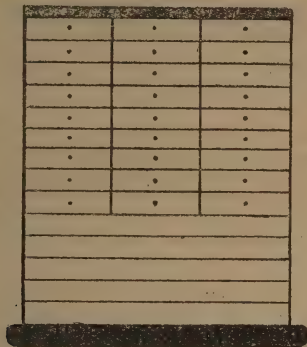
My note has special reference to the use of P.O.P. in hot climates, and where well-water is used for washing. I have had occasion to move about all over the country, and have used various sorts of water, and I am certain that well-water always contains salts in solution; these salts varying in the various localities. It is also clear to me that these salts materially affect the toning of prints, so much so as to make it impossible to reproduce in all places the exact tone (or colour) one wants. That is, unless one take special precautions. I find it an excellent practice in all places, after washing the prints for a quarter of an hour or so, to give them a couple of changes in water that has been boiled, and to also make up the toning bath with boiled water, and to place the prints, as they finish toning, in a boiled-water bath. I find it also a great improvement, in making up the sulpho-cyanide solution, to add 1 grain of sulphite of soda to every 10 of the first-named salt. With these modifications I find no trouble in getting exactly what I want in the way of tone-colour.

H. HANDS, Jubbulpore, C.P., E.I.

Use for Empty Lantern Slide Boxes.

These can be turned to good account by making the following useful article. For a cabinet standing about 17in., 56 boxes will be needed, these may be arranged 4 drawers wide by 14 deep, only the bottoms of the boxes being used. First of all, a wooden case must be constructed for the framework, the wood at the bottom being thicker, and projecting about an inch, to form a stand. Stout Willesden card will be found strong enough for the back of cabinet, and also shelves for the drawers to rest on. The woodwork can either be painted or covered with book-binder's cloth according to taste, coloured paper to match being used for the drawers. Handles are the next consideration, for which boot buttons will be found to answer the purpose admirably. A small slit should be made with a penknife in the centre of each drawer, through which the shank of the button can be pressed, a short piece of wire making it fast

on the inside. To avoid a search through many drawers before the desired article is discovered, each drawer should be numbered and a catalogue kept with corresponding numbers and a list of the contents of



each, viz.:—1, gummed strips; 2, oval masks; 3, lens flange; and so on. The cabinet is now complete, and will be found a most useful receptacle for the numerous small odds and ends that help to make up a photographic outfit.

(MISS) CARRIE PERCIVAL-WISEMAN.

Painswick Lodge, Weston-super-Mare.

Water Varnish.

Probably few among the many thousands of amateur photographers are aware of the valuable properties of what is termed "A Water Varnish." Seeing that this useful chemical is not sold, like other varnishes generally are, by photographic dealers, the chances are that many of our readers whose experience does not date back beyond the introduction of the modern dry plate may never have heard of such a varnish. On the other hand, those who can look back upon a studio practice in the days of wet collodion will require no reminder of the advantages this simple wash conferred on a collodion film by reason of its being a certain preventative of the film splitting. In cases where only one or two proofs were required from a negative, its application did away with the necessity of the additional operation of varnishing by means of a spirit varnish. It also provided a most excellent tooth to the surface of the film, to enable any amount of retouching being performed. It is not only in connection with its application to a wet collodion film that water varnish forms a valuable addition to the stock of chemicals in all-round photography. It is almost invaluable in the case of gelatine negatives, as with wet collodion films. In the case of gelatine negatives, the water varnish is applied in the shape of a wash, directly after the negatives have been washed to free their films from all traces of hypo, or, in other words, at that stage when the usual drying operation would begin. After the varnish has been applied the films are dried in the usual manner, and its application will soon convince anyone that has experienced the difficulty of retouching by reason of the want of a tooth in the film to make a lead pencil bite, as the saying goes, that, were this the only benefit accruing from its application, it is well worthy of being employed.

MISCELLANEOUS INFORMATION.

THE COPYRIGHT (WORKS OF ART) ACT (1862).

An Act for amending the Law relating to Copyright in Works of the Fine Arts, and for repressing the Commission of Fraud in the Production and Sale of such Works.

WHEREAS by law, as now established, the authors of paintings, drawings, and photographs, have no copyright in such their works, and it is expedient that the law should in that respect be amended: Be it therefore enacted by the Queen's Most Excellent Majesty, by and with the advice and consent of the Lords spiritual and temporal, and Commons, in this present Parliament assembled, and by the authority of the same, as follows:—

Copyright in Works Hereafter Made or Sold to Vest in the Author for his Life, and for Seven Years after his Death.

1. The author, being a *British* subject or resident within the dominions of the Crown, of every original painting, drawing, and photograph which shall be or shall have been made either in the *British* dominions or elsewhere, and which shall not have been sold or disposed of before the commencement of this Act, and his assigns, shall have the sole and exclusive right of copying, engraving, reproducing and multiplying such painting or drawing, and the design thereof, or such photograph, and the negative thereof, by any means and of any size, for the term of the natural life of such author, and seven years after his death; provided that when any painting or drawing, or the negative of any photograph, shall for the first time after the passing of this Act be sold or disposed of, or shall be made or executed for or on behalf of any other person for a good or a valuable consideration, the person so selling or disposing of or making or executing the same shall not retain the copyright thereof, unless it be expressly reserved to him by agreement in writing, signed, at or before the time of such sale or disposition, by the vendee or assignee of such painting or drawing, or of such negative of a photograph, or to the person for or on whose behalf the same shall be so made or executed, but the copyright shall belong to the vendee or assignee of such painting or drawing, or of such negative of a photograph, or to the person for or on whose behalf the same shall have been made or executed; nor shall the vendee or assignee thereof be entitled to any such copyright, unless, at or before the time of such sale or disposition, an agreement in writing, signed by the person so selling or disposing of the same, or by his agent duly authorised, shall have been made to that effect.

Copyright not to prevent the Representation of the Same Subjects in Other Works.

2. Nothing herein contained shall prejudice the right of any person to copy or use any work in which there shall be no copyright, or to

represent any scene or object, notwithstanding that there may be copyright in some representation of such scene or object.

Assignments, Licenses, &c., to be in Writing.

3. All copyright under this Act shall be deemed personal or moveable estate, and shall be assignable at law, and every assignment thereof, and every license to use or copy by any means or process the design or work which shall be the subject of such copyright, shall be made by some note or memorandum in writing, to be signed by the proprietor of the copyright, or by his agent appointed for that purpose in writing.

Register of Proprietors of Copyrights in Paintings, Drawings, and Photographs to be kept at Stationers' Hall, as in 5 & 6 Vict., cap 45.

4. There shall be kept at the Hall of the Stationers' Company, by the Officer appointed by the said Company for the purposes of the Act passed in sixth year of Her present Majesty, intituled *An Act to Amend the Law of Copyright*, a book or books, entitled 'The Register of Proprietors of Copyright in Paintings, Drawings, and Photographs,' wherein shall be entered a memorandum of every copyright to which any person shall be entitled under this Act, and also of every subsequent assignment of any such copyright; and such memorandum shall contain a statement of the date of such agreement or assignment, and of the names of the parties thereto, and of the name and place of abode of the person in whom such copyright shall be vested by virtue thereof, and of the name and place of abode of the author of the work in which there shall be such copyright, together with a short description of the nature and subject of such work and in addition thereto, if the person registering shall so desire, a sketch, outline, or photograph of the said work, and no proprietor of any such copyright shall be entitled to the benefit of this Act until such registration, and no action shall be sustainable nor any penalty recoverable in respect of anything done before registration.

Certain Enactments of 5 and 6 Vict., c. 45, to Apply to the Books to be Kept under this Act.

5. The several enactments in the said Act of the sixth year of Her present Majesty contained, with relation to keeping the register book thereby required, and the inspection thereof, the searches therein, and the delivery of certified and stamped copies thereof, the reception of such copies in evidence, the making of false entries in the said book, and the production in evidence of papers falsely purporting to be copies of entries in the said book, the application to the Courts and Judges by persons aggrieved by entries in the said book, and the expunging and varying such entries, shall apply to the book or books to be kept by virtue of this Act, and to the entries and assignments of copyright and proprietorship therein under this Act, in such and the same manner as if such enactments were here expressly enacted in relation thereto, save and except that the forms of entry prescribed by the said Act of the sixth year of Her present Majesty may be varied to meet the circumstances of the case, and that the sum to be demanded by the officer of the said Company of Stationers for making any entry required by this Act shall be one shilling only.

Penalties on Infringement of Copyright.

6. If the author of any painting, drawing, or photograph in which there shall be subsisting copyright, after having sold or disposed of such copyright, or if any other person, not being the proprietor for the time being of copyright in any painting, drawing, or photograph, shall, without the consent of such proprietor, repeat, copy, colourably imitate, or otherwise multiply for sale, hire, exhibition, or distribution, or cause or procure to be repeated, copied, colourably imitated, or otherwise multiplied for sale, hire, exhibition, or distribution, any such work or the design thereof, or, knowing that any such repetition, copy, or other imitation has been unlawfully made, shall import into any part of the United Kingdom, or sell, publish, let to hire, exhibit, or distribute, or offer for sale, hire, exhibition, or distribution, or cause or procure to be imported, sold, published, let to hire, distributed, or offered for sale, hire, exhibition, or distribution, any repetition, copy, or imitation of the said work, or of the design thereof, made without such consent as aforesaid, such person for every such offence shall forfeit to the proprietor of the copyright for the time being a sum not exceeding ten pounds; and all such repetitions, copies, and imitations, made without such consent as aforesaid, and all negatives of photographs made for the purpose of obtaining such copies, shall be forfeited to the proprietor of the copyright.

Penalties on Fraudulent Productions and Sales.

7. No person shall do or cause to be done any or either of the following Acts: that is to say,—

First, no person shall fraudulently sign or otherwise affix, or fraudulently cause to be signed or otherwise affixed to or upon any painting, drawing, or photograph, or the negative thereof, any name, initials, or monogram:

Secondly, no person shall fraudulently sell, publish, exhibit, or dispose of, or offer for sale, exhibition, or distribution, any painting, drawing, or photograph, or negative of a photograph, having thereon the name, initials, or monogram, of a person who did not execute or make such work:

Thirdly, no person shall fraudulently utter, dispose, or put off, or cause to be uttered or disposed of, any copy or colourable imitation of any painting, drawing, or photograph, or negative of a photograph, whether there shall be subsisting copyright therein or not, as having been made or executed by the author or maker of the original work from which such copy or limitation shall have been taken.

Fourthly, where the author or maker of any painting, drawing, or photograph, or negative of a photograph, made either before or after the passing of this Act, shall have sold or otherwise parted with the possession of such work, if any alteration be afterwards made therein by any other person, by addition or otherwise, no person shall be at liberty, during the life of the author or maker of such work, without his consent, to make or knowingly to sell or publish, or offer for sale, such work or any copies of such work so altered as aforesaid, or of any part thereof, as or for the unaltered work of such author or maker.

Penalties.

Every offender under this section shall, upon conviction, forfeit to

the person aggrieved a sum not exceeding ten pounds, or not exceeding double the full price, if any, at which all such copies, engravings, imitations, or altered works shall have been sold or offered for sale; and all such copies, engravings, or imitations, or altered works shall be forfeited to the person, or the assigns, or legal representatives of the person whose name, initials, or monogram shall be so fraudulently signed or affixed thereto, or to whom such spurious or altered work shall be so fraudulently or falsely ascribed as aforesaid: Provided always, that the penalties imposed by this section shall not be incurred unless the person whose name, initials, or monogram shall be so fraudulently signed or affixed, or to whom such spurious or altered work shall be so fraudulently or falsely ascribed as aforesaid, shall have been living at or within twenty years next before the time when the offence may have been committed.

Recovery of Pecuniary Penalties.

8. All pecuniary penalties which shall be incurred, and all such unlawful copies, imitations, and all other effects and things as shall have been forfeited by offenders, pursuant to this Act, and pursuant to any Act for the protection of copyright engravings, may be recovered by the person hereinbefore and in any such Act as aforesaid empowered to recover the same respectively, and hereinafter called the complainant or the complainer, as follows:

In *England and Ireland*, either by action against the party offending or by summary proceeding before any two Justices having jurisdiction where the party offending resides:

in *Scotland*, by action before the Court of Session in ordinary form, or by summary action before the Sheriff of the County where the offence may be committed or the offender resides, who, upon proof of the offence or offences, either by confession of the party offending or by the oath or affirmation of one or more credible witnesses, shall convict the offender, and find him liable to the penalty or penalties aforesaid, as also in expenses; and it shall be lawful for the Sheriff, in pronouncing such judgment for the penalty or penalties and costs, to insert in such judgment a warrant, in the event of such penalty or penalties and costs not being paid, to levy and recover the amount of the same by poinding: Provided always, that it shall be lawful to the Sheriff, in the event of his dismissing the action and assoilzieing the defender, to find the complainer liable in expenses, and any judgment as to be pronounced by the Sheriff in such summary application shall be final and conclusive, and not subject to review by advocacy, suspension, reduction, or otherwise.

Superior Courts of Record in which any Action is Pending may Make an Order for an Injunction, Inspection, or Account.

9. In any action in any of Her Majesty's Superior Courts of Record at *Westminster* and in *Dublin*, for the infringement of any such copyright as aforesaid, it shall be lawful for the Court in which such action is pending, if the Court be then sitting, or if the Court be not sitting then, for a judge of such Court, on the application of the plaintiff or defendant respectively, to make such order for an injunction, inspection, or account, and to give such direction respecting such action, injunction, inspection, or account, and the proceedings therein respectively, as to such Court or Judge may seem fit.

Importation of Pirated Works Prohibited.—Application in such Cases of Customs Act.

10. All repetitions, copies, or imitations of paintings, drawings, or photographs, wherein or in the design whereof there shall be subsisting copyright under this Act, and all repetitions, copies, and imitations of the design of any such painting or drawing, or of the negative of any such photograph, which, contrary to the provisions of this Act, shall have been made in any Foreign State, or in any part of the *British dominions*, are hereby absolutely prohibited to be imported into any part of the United Kingdom except by or with the consent of the proprietor of the copyright thereof, or his agent authorised in writing; and if the proprietor of any such copyright, or his agent, shall declare that any goods imported are repetitions, copies, or imitations of any such painting, drawing or photograph, or of the negative of any such photograph, and so prohibited as aforesaid, then such goods may be detained by the Officers of Her Majesty's Customs.

Saving of Right to Bring Action for Damages.

11. If the author of any painting, drawing, or photograph, in which there shall be subsisting copyright, after having sold or otherwise disposed of such copyright, or if any other person, not being the proprietor for the time being of such copyright, shall, without the consent of such proprietor, repeat, copy, colourably imitate, or otherwise multiply, or cause to procure to be repeated, copied, or colourably imitated, or otherwise multiplied, for sale, hire, exhibition, or distribution, any such work or the design thereof, or the negative of any such photograph, or shall import or cause to be imported into any part of the United Kingdom, or sell, publish, let to hire, exhibit, or distribute, or offer for sale, hire, exhibition, or distribution, or cause or procure to be sold, published, let to hire, exhibited, or distributed, or offered for sale, hire, exhibition, or distribution, any repetition, copy, or imitation of such work, or the design thereof, or the negative of any such photograph, made without such consent as aforesaid, then every such proprietors, in addition to the remedies hereby given for the recovery of any such penalties, and forfeiture of any such things as aforesaid, may recover damages by and in a special action on the case, to be brought against the person so offending, and may in such action recover and enforce the delivery to him of all unlawful repetitions, copies, and imitations, and negatives of photographs, or may recover damages for the retention or conversion thereof: Provided that nothing herein contained, nor any proceeding, conviction, or judgment, for any act hereby forbidden, shall effect any remedy which any person aggrieved by such Act may be entitled to either at law or in equity.

Provisions of 7 & 8 Vict., c. 12, to be Considered as Included in this Act.

12. This Act shall be considered as including the provisions of the Act passed in the Session of Parliament held in the seventh and eighth years of Her present Majesty, intituled *An Act to Amend the Law relating to International Copyright*, in the same manner as if such provisions were part of this Act.

LIST OF THE PRINCIPAL TEXT-BOOKS ON PHOTOGRAPHY.

[The books mentioned below are obtainable by order of all photographic dealers.]

- Burton's Modern Photography.* By W. K. Burton. 1s.
- Early Work in Photography.* By W. Ethelbert Henry, C.E. 1s.
- Guide to Practical Photography.* By T. N. Armstrong. 1s.
- Instruction in Photography.* By Sir William Abney. 10th Edition
Revised and enlarged. 6s.
- Science and Practice of Photography.* By Chapman Jones. 3s. 6d., 2s. 6d.
- Photography with Emulsions.* By Sir William Abney, F.R.S. 3s.
- The First Principles of Photography.* By Clement J. Leaper. 5s.
- Photo-ceramics.* Photography applied to the decoration of Plaques,
Pottery, and other Ceramic and Metallic Surfaces. By W. Ethelbert Henry,
C.E., and H. Snowden Ward. 1s.
- Photographic Enlargements. How to Make Them.* By Geo. Wheeler. 1s.
- Bromide Paper. Instructions for Contract Printing and Enlarging.* By
Dr. E. A. Just. 1s. 6d.
- Bromide Enlarging and Contract Printing.* By S. Herbert Fry. 6d.
- Negative-making.* By Sir William Abney, F.R.S. 1s.
- Artistic Lighting.* By James Inglis. 4s. 6d.
- Instantaneous Photography.* By Sir William Abney, F.R.S. 1s.
- The Lighting in Photographic Studios.* By P. C. Duchochois. Revised,
with additional matter by W. Ethelbert Henry, C.E. 1s.
- Chemistry for Photographers.* By Charles F. Townsend, F.C.S., F.R.P.S. 1s.
- Art of Retouching Negatives, and Finishing and Colouring Photographs.*
By Robert Johnson. 2s.
- Art of Retouching.* By J. Hubert. 1s.
- Enamelling and Retouching.* By Piquepe. Cloth. 1s.
- Art and Practice of Silver Printing.* By H. P. Robinson and Sir William
Abney. 2s. 6d.
- Platinotype: Its Preparation and Manipulation.* By Sir William Abney
and Lionel Clark. 2s. 6d.
- Lens work for Amateurs.* By Henry Orford. 3s.
- Photographic Optics, a Treatise on.* By R. S. Cole. 6s.
- The Optics of Photography and Photographic Lenses.* By J. Traill Taylor.
3s. 6d.
- Optics for Photographers.* By W. K. Burton. 1s.
- Photographic Lenses. How to Choose and How to Use.* By John A.
Hodges. 2s.
- The Studio and What to Do in it.* By H. P. Robinson. 2s. 6d.
- Practical Photo-micrography.* By Andrew Pringle. 5s.
- Photo-micrography.* By E. J. Spitta. 12s.

- Action of Light in Photography.* By Sir William Abney. 3s. 6d.
Encyclopædia of Photography. By Walter E. Woodbury. 7s. 6d.
Dictionary of Photography. By E. J. Wall. 7s. 6d.
The Photographic Studio. A guide to its construction, &c. By T. Bolas, 2s.
Living Pictures. By H. V. Hopwood. 2s. 6d.
The Evolution of Photography. By John Werge. Personal chronological reminiscences of nearly half a century. 3s. 6d.
Photography: Its History, Processes, Apparatus, and materials. By A. Brothers. 21s.
The Elements of a Pictorial Photograph. By H. P. Robinson. 2s. 6d.
Naturalistic Photography. 3rd Edition. Revised, enlarged and re-written by Dr. P. H. Emerson. 5s.
Picture making by Photography. By H. P. Robinson. 2s. 6d.
Art Photography. By H. P. Robinson. 1s.
Practical Essays on Art. By John Burnet. 1. Composition. 2. Light and Shade. 3. The Education of the Eye. 2s. 6d.
Pictorial Effect in Photography. By H. P. Robinson. 3s. 6d.
Bichromate Salts in Photography. Six Lectures by Sir William Abney C.B., R.E., D.C.L., J. A. Sinclair, F.R.P.S., W. E. Debenham, J. D. Geddes, W. T. Wilkinson. 1s.
Stereoscope and Stereoscopic Photography. From the French of F. Drouin. 2s.
Wet-collodion Photography. By Chas. W. Gamble. 1s.
Art of Photographic Painting. By A. H. Bool. 1s.
ABC Guide to Autotype Permanent Photography. By J. R. Sawyer. With Autotype Frontispiece. 2s. 6d.
Ferric and Heliographic Processes. By G. E. Brown, F.I.C. 2s.
Photographic Reproduction Processes. By P. C. Duchochois. A treatise on Photographic Impressions without silver salts. 3s. 6d.
Tables of Conjugate Foci. For the Users of Photographic Lenses. Compiled and Explained by J. R. Gotz, F.R.P.S. 2nd Edition. 6d.
Photo-lithography. By George Fritz. Translated by E. J. Wall. 3s. 6d.
Photo-engraving. By H. D. Farquhar. 2s. 6d.
Photo-mechanical Processes. By W. T. Wilkinson. 5s.
A Treatise on Photography in Intaglio. By the Talbot Klic Process. By Herbert Denison, F.R.P.S. 4s. 6d.
Photo-aquatint and Photogravure. A Practical Treatise with many Illustrations, and Photo-aquatint Plate by the Author. By Thomas Huson, R.I. 2s.
Half-tone Process. On Zinc and Copper. By Julius Varfusser. 2s.
Half-tone Process on the American Basis. By Wm. Cronenberg. 2s.
Photographic and Photo-mechanical Printing Processes. By W. K. Burton. 4s.
Practical Radiography. A handbook of the applications of the X-rays. With Illustrations. The Second Edition, entirely rewritten and up to date. By A. W. Isenthal and H. Snowden Ward. 2s. 6d.
Optical Projection. A Treatise on the use of the Lantern in Exhibition and Scientific Demonstration. By Lewis Wright. 6s.

The Optical Lantern: for Instruction and Amusement. By Andrew Pringle, F.R.M.S. 2s. 6d.

Popular Photographic Printing Processes. By Hector Maclean, F.R.P.S. F.G.S.

PRINCIPAL FOREIGN PHOTOGRAPHIC PERIODICALS.

FRANCE.

Bulletin de la Société Française de photographie.—Published by Gauthier-Villars et fils, quai des Grands-Augustins, 55, Paris.

Moniteur de la photographie.—Gauthier-Villars et fils, 55, quai des Grands-Augustins, Paris.

Bulletin du Photo-Club de Paris.—40, rue des Mathurins, Paris.

Photo-Gazette.—3, rue Racine, Paris.

GERMANY.

Photographisches Wochenblatt.—Potsdamerstrasse, 89, Berlin.

Deutsche Photographen Zeitung.—Weimar.

Photographisches Archiv.—E. Liesegang, Dusseldorf.

Photographisches Mittheilungen.—Prof. Dr. H. W. Vogel, 124, Kurfuerstien-Str, Berlin.

Der Amateur Photograph.—Dr. Paul Liesegang, Dusseldorf.

AUSTRIA.

Die Photographie.—17, Theresiengasse, Vienna.

Photographische Correspondenz.—Ludwig Schrank, Hautstrasse, 9, Vienna, Austria.

Photographische Rundschau.—Charles Scolik, Paristengasse, 48, Vienna.

BELGIUM.

Bulletin de l'Association belge de photographie.—M. Ch. Puttemans, palais du Midi, Brussels.

Helios.—103, boulevard de la Senne, Brussels.

UNITED STATES.

Photographic Times.—423, Broome Street, New York.

Anthony's Photographic Bulletin.—591, Broadway, New York.

American Amateur Photographer.—239-241, Fifth Avenue, New York.

Photo American.—9, East 17th Street, New York.

Photo Beacon.—The Beacon Publishing Company, Tribune Buildings, Chicago, Illinois.

Saint Louis and Canadian Photographer.—2700, Pine Street, Saint Louis Missouri.

Wilson's Photographic Magazine.—853, Broadway, New York.

INDIA.

Journal of the Photographic Society of India.—Calcutta.

St. Veronica.—2, Marquis Street, Calcutta.

ITALY.

Bolletino della Società fotografica Italiana.—Via del Giglio, Florence.

Bolletino dell'Associazione degli Amatori di Fotografia.—25, Via Poli, Rome.

Dilettante di Fotografia (Il).—Milan.

Revista Scientifico-Artistica di Fotografia.—30, Via Principe Umberto Milan.

Il Progressio Fotografico.—Via S. Maria Sogreta, Milan.

JAPAN.

Sashin Shimpo.

RUSSIA.

Bulletin mensuel de la Société Impériale russe, Section de la photographie,
4, Panteleenskaja, St. Petersburg.

SWEDEN.

Fotografisk Tidskrift.—Albin Roosval, Stockholm.

SWITZERLAND.

Revue suisse de photographie.—40, rue du Marché, Geneva.

THE PROFESSIONAL PHOTOGRAPHERS' ASSOCIATION.

(The following notes are abstracted from the P.P.A. Handbook No. 3.)

FOREWORDS.

THE Professional Photographers' Association is the one and only representative body of its kind throughout the British Empire. Its objects are, to improve the status of those who practise photography as a profession; to defend their interests; to assist them by advice; to afford them opportunities for meeting and discussing matters pertaining to the advancement of the craft; and to employ all legitimate means of upholding the rights and dignities of the profession.

In the first year of its existence it has received the active support of between five and six hundred members, and has earned commendation from all parts of the world. Besides its legislative sphere, the Association has its social uses, and it also aims at constituting itself the authoritative governing body of British professional photographers throughout the world.

A vast field of work lies before the Association, in the furtherance of whose objects it is hoped that it will secure the active membership of the many thousands of photographers who have not yet joined.

Officers and Committee of the Professional Photographers' Association.

President.—William Grove.

Past President.—Thomas Bedding, F.R.P.S.

Vice-Presidents.—H. Walter Barnett, W. Crooke, Ernest Elliott.

Committee:

London.—F. A. Bridge, H. J. Dalby, Alfred Ellis, H. Edmonds Hull, M. Jacolette, A. Mackie, Edgar Scamell, G. V. Simmons, Lang Sims, T. C. Turner.

Country.—W. Barry (Hull), H. A. Chapman (Swansea), W. Gill (Colchester), Frank Moffatt (Edinburgh), G. W. Morgan (Aberdeen), H. C. Spink (Brighton), W. D. Valentine, J.P. (Dundee), G. Watmough Webster (Chester), H. J. Whitlock (Birmingham), Alfred Werner (Dublin).

Hon. Treasurer.—William Grove, 63a, Baker Street, London, W.

Hon. Secretary.—Alfred Ellis, 51, Baker Street, London, W.

Hon. Solicitor.—P. E. Marshall, Esq., 62, Lincoln's Inn Fields, London, W.C.

Auditors.—S. H. Fry, 12, South Villas, Camden Square, N.W.; M. B. Barraud, 54, Clarence Street, Kingston-on-Thames.

Bankers.—National Provincial Bank of England.

NOTICES TO MEMBERS.

All communications for the P.P.A. should be addressed to the Honorary Secretary, 51, Baker Street, London, W.



THE SNOW SHOWER.

Taken with the **Goerz Anschutz Folding Camera** and
Goerz Double Anastigmat.



Taken with the
Goerz Anschutz Folding Camera
AND
Goerz Double Anastigmat
in $\frac{1}{1000}$ th of a second.

Members will greatly oblige by addressing their communications thus:—
Professional Photographers' Association.

ALFRED ELLIS, Hon. Sec.,
51, Baker Street,
London, W.,

to distinguish them from the business letters of Alfred Ellis and Walery.

Members are reminded that their annual subscription became due on July 1st, 1902.

Members are advised, wherever practicable, to become dealers in photographic materials, in order to obviate the unfair competition they are subjected to by shopkeepers, and others, who are not photographers, undertaking the production of portraits, enlargements, etc., which legitimately fall within the sphere of professional photographic work.

“* Members desiring legal advice must make application to the Hon. Secretary, Mr. Alfred Ellis, 51, Baker Street, W., who will place the matter before the committee. Application for advice may, however, be made direct to the Association's Hon. Solicitor, Mr. P. E. Marshall, 62, Lincoln's Inn Fields, W.C., but in such cases the Association accepts no responsibility.

“* It is suggested by the committee that, on their cards, note headings, invoices, and business stationery, members should print the words, “Member of the Professional Photographers' Association.”

FIRE INSURANCE.

In accordance with instructions from the general meeting of the members held on February 7th, the committee have made arrangements with the Fine Art and General Insurance Co., Ltd., of 90, Cannon Street, London, E.C., by which any member may transfer his present policy to this company, and obtain a reduction of 20 per cent. on the premiums hitherto paid. To secure this concession, it will be necessary for the member to forward his policy to the Hon. Secretary, Mr. Alfred Ellis, 51, Baker Street, W. A charge note for the premium will then be sent, holding the insured covered for a period of thirty days to enable the new policy to be prepared.

In cases where the member has not been previously insured, or requires a new policy, it will be necessary to have an accompanying proposal form completed, when the insurance company will allow a discount of 20 per cent. off their usual rates.

COPYRIGHT.

The committee, during the past year, having had many applications for advice on copyright matters, make the following suggestions for the guidance of members:—

1. Important.—A copyright photograph is one taken at the photographer's own expense, and for which he does not receive payment or other stipulated consideration. It is recommended that in all cases distinction should be made in members' books between photographs that are charged for, and those for which no charge is made.

2. Registration.—Every copyright photograph should be registered by the proprietor delivering or sending by post prepaid to the Registrar, Copyright Office, Stationers' Hall, London, E.C., a signed memorandum of such copyright, with a fee of one shilling. Special forms, one penny each, containing full instructions of how to register a photograph, can be obtained on application at Stationers' Hall.

3. Necessity of Registration.—No proprietor of a copyright is entitled to the benefit of the Act until registration, and no action can be main-

tained or any penalty recovered in respect of any infringement before registration. In registering, the name of the actual photographer should be inserted as author.

4. *Transfer of Negatives.*—In all cases where a negative of a photograph is transferred for the first time by the owner to any other person, the copyright will cease to exist, unless at or before the time of such transfer an agreement in writing be signed by the transferee reserving the copyright to the owner, or by the owner transferring the copyright to the transferee as may be the intention of the parties. A member purchasing a business or another photographer's negatives should be careful to see that the copyrights are properly assigned and registered in his own name.

5. *Reproductions.*—Members are advised not to give permission for their copyright photographs to be reproduced until they have full particulars of the size and style of the proposed reproduction, and to formulate their charges accordingly. For example: A newspaper should pay a fee of not less than 10s. 6d. for half-tone black-and-white reproduction not exceeding 6in. by 4in., when printed with letterpress in one issue of the paper; but if it is printed as an inset the fee should be at least one guinea. If printed in colours, collotype, or photogravure, it should be a still higher fee. If the photograph is to be reproduced for advertising purposes, a higher fee should be charged than for newspaper work. In all cases, the permission should be in writing, and state the amount of fee to be paid, the process by which the photograph is to be reproduced (whether in black-and-white or colours), the limit size, and the purpose for which the reproduction is to be used.

RULES OF THE PROFESSIONAL PHOTOGRAPHERS' ASSOCIATION.

(FOUNDED MARCH 28, 1901.)

1. The Association shall be called "The Professional Photographers' Association."

2. The objects of the Association shall be: (*a*) To promote the interests of its members in their professional work. (*b*) To watch Parliamentary or public action affecting the interests of Photographers. (*c*) To deal with matters affecting professional custom and practice. (*d*) To co-operate with similar associations for the purpose of securing united action and mutual support in dealing with matters affecting the profession.

3. Membership shall be restricted to persons engaged in the commercial production of photographs, who shall be either in business on their own account, or in partnership, or responsible managers of firms or companies.

4. Professional photographers may be admitted to membership on the nomination of a member, or on their own application; the Committee shall decide any question as to eligibility.

5. The annual subscription shall be 5s. payable on admission, subsequent subscriptions shall be payable in advance on July 1 in each year. No member shall be entitled to any of the privileges of membership if his subscription shall be three months in arrear, and the Committee shall have power to terminate the membership of any one whose subscription is more than six months in arrear.

6. The ordinary meetings of the Association shall be devoted to the discussion of matters concerning the welfare of professional photographers and the profession only; they shall be held on the first Fridays in February, April, June, October, and December. The Committee may call extraordinary meetings when they may think it advisable.

7. All General meetings shall be held in the first week in July, for the purpose of receiving the report of the Committee and the balance-sheet for the past year, the election of Officers, and such other business as may require the decision of a general meeting. Notice of the meeting, together with a ballot paper, shall be sent to every member not less than fourteen days before the date of the meeting. A special general meeting may be called by the Committee at any time. A special general meeting shall be called within fourteen days of the receipt by the Hon. Secretary of a requisition signed by ten members stating the purpose of the meeting. Every member shall receive seven days' notice of a special general meeting, and no subject shall be discussed thereat but that for which the meeting is called.

8. Alterations of the rules shall only be made at the general meetings or a special general meeting. The alterations proposed shall be stated in the notice convening the meeting.

9. At all meetings the vote shall be taken by show of hands unless a ballot be demanded.

10. The Honorary Officers of the Association constituting the Committee shall be a President, Vice-President, Treasurer, Secretary, and twenty ordinary members of the Committee, not more than ten of whom shall be London members. They shall have power to appoint an Assistant Secretary, who may be paid. At meetings of the Committee, five shall form a quorum.

11. The Committee may make such by-laws and regulations, not inconsistent with the rules, as they may from time to time think necessary. They shall also have power to appoint sub-committees for special objects from the members of the Association.

12. The Officers shall retire annually, but shall be eligible for re-election. At a special meeting of the Committee, to be held in the month of May, the Committee shall select by ballot a President, a Vice-President, and twenty-two other members for the new Committee as their nomination. Any member, by letter addressed to the Hon. Secretary not later than May 31, may nominate a President, Vice-President, and not more than twenty-two other members. The Hon. Secretary shall write to each member nominated to any office, asking whether he is willing to serve if elected, and no reply within four days shall be taken to signify acquiescence. A ballot paper shall be prepared containing the names of all the members nominated, and eligible and willing to serve, in alphabetical order, but no other information except that relating to the taking of the ballot. The ballot papers shall be collected at the Annual General Meeting at nine o'clock.

13. At their first meeting the new Committee shall elect a Treasurer from amongst those elected on the Committee. They may appoint any member as Hon. Secretary, notwithstanding such appointment may increase the number of ordinary members of Committee by one. Should any Officer resign, or become incapable of acting, the Committee may fill the vacancy.

14. If ten members shall sign a report to the effect that they consider it desirable that the membership of any member shall be terminated, on account of conduct either tending to bring discredit on the profession or obnoxious to his fellow members, the Committee on receipt thereof shall call a special general meeting to discuss the matter; then if a majority of two-thirds of those present so decide, the offending member shall be expelled.

15. Proper books of account shall be kept by the Treasurer, and a book of minutes of all meetings shall be kept by the Hon. Secretary.

16. The payment of a subscription by a member shall be taken as indicating acquiescence in these rules.

THE AFFILIATION OF PHOTOGRAPHIC SOCIETIES.

[Reprinted from the Photographic Red Book.]

Officers:—Chairman: The Right Hon. the Earl of Crawford, K.T., F.R.S.; Executive Committee: Robert Beckett, F.R.P.S. (Hackney); C. Churchill, F.R.P.S. (Woolwich); John F. East (Kingston-on-Thames); Walter Kilbey (N.W. London); A. Mackie (London and Provincial); E. Marriage, F.R.P.S. (Woodford); J. C. S. Mummary (North Middlesex); C. H. Oakden, F.R.P.S. (South London); H. C. Rapson (London and Provincial); W. R. Stretton (Photographic Club); Hon. Treasurer: George Scamell, F.R.P.S.; Auditors: F. W. Bannister (Borough Polytechnic); W. H. Wilshire (West Surrey); Secretary: A. W. W. Bartlett, 66, Russell Square, London, W.C.

BENEFITS AND PRIVILEGES.

Affiliated Societies are entitled to the following benefits and privileges:—

The loan of illustrated lectures on photographic and kindred topics, sets of lantern slides, lantern lectures, pictures for exhibition, etc.

Permission to photograph in the places specified on page 5, upon production of this issue of the Photographic Red Book, without special application to the various authorities.

Two copies of each issue of the PHOTOGRAPHIC JOURNAL, in which are published the proceedings of the Affiliation Committee and the transactions of the Royal Photographic Society of Great Britain.

Reduced rates for wall space and admission at the annual exhibition of the Royal Photographic Society of Great Britain.

Members of affiliated Societies joining the Royal Photographic Society of Great Britain receive exemption from the payment of entrance fee, provided they have been for at least two years members of an affiliated Society. The secretaries and delegates of affiliated Societies are empowered to propose and second the nominations of such candidates.

The services of a board of judges in respect of small Society competitions. Details are given on page 24.

Temporary use of the accommodation provided by the various Societies to members away from their own districts. Details are given, commencing page 28.

MANAGEMENT.

Every affiliated Society has a voice in the management of the affiliation through the two delegates which each is entitled to appoint. The general body of delegates meets, as a rule, but once a year, the business in the meantime being conducted by an executive committee appointed under the provisions of Rule 6. The two delegates appointed by each Society need not necessarily be members of the Society they represent. The Royal Photographic Society of Great Britain reserves one-third of the amount of the subscriptions for secretarial, clerical, and incidental working expenses. The Affiliation Committee have the remaining two-thirds entirely at their disposal.

RULES.

(1) Affiliation shall be by the council of the Royal Photographic Society of Great Britain.

(2) All Societies interested in photography, whether London, provincial, colonial, or foreign, shall be eligible for affiliation.

(3) The object of the affiliation shall be to consider and suggest lines of action to the affiliated Societies, and to take any steps it may think

fit to encourage or otherwise benefit them. Each affiliated Society shall be entitled to appoint two delegates, who, in conjunction with three members to be appointed by the Royal Photographic Society of Great Britain, shall form the Affiliation Committee, with the right to vote in all matters in which the committee may deal.

(4) The committee shall have the power to make the necessary rules for the conduct of the different branches of its work, and, subject to fourteen days' notice in writing to each delegate, such rules may be altered, added to, or revoked at the annual general meeting or at a special general meeting. All such rules and alterations shall be submitted to the council of the Royal Photographic Society of Great Britain, and be approved by it before they come into force.

(5) The committee shall meet at such time and place as the chairman shall decide. On the requisition of ten delegates the secretary shall call a meeting, not less than fourteen nor more than twenty-one days after receipt thereof. At committee meetings nine shall form a quorum.

(6) The committee shall have power to nominate certain of their number to form an executive. The executive shall have power to make such regulations, not inconsistent with the rules, as may from time to time be deemed necessary.

(7) Upon the request of two-fifths of those present at any meeting of the executive, the votes of the committee shall be taken in writing upon any subject, otherwise proxy voting shall be inadmissible.

(8) The subscription shall be one guinea, payable on admission, and subsequently in advance on January 1st in each year. Any Society whose subscription may be three months overdue shall be suspended from affiliation, and if at the end of twelve months the subscription remain unpaid the defaulting Society shall cease to be affiliated, but may be reinstated by the council after satisfactory explanation.

(9) A balance-sheet of the accounts of the affiliation shall be prepared by the treasurer up to December 3rd in each year, and shall be audited by two auditors. The annual general meeting of the committee shall be held during January in each year. At this meeting the balance-sheet, duly audited, and the chairman's report of the year's proceedings shall be submitted, and officers, consisting of a chairman, treasurer, and two auditors, shall be elected for the current year.

INTERCHANGE OF LECTURES.

The committee are enabled to publish below the names of a number of members of affiliated Societies who have signified their readiness to lecture before other affiliated Societies in exchange for a similar courtesy to their own from a member of the Society obliged by them. This system of exchange has been the means of lending much additional interest to many programmes, and the committee trust that full use will be made of the lectures here offered. The number of lectures available is still small, but it is hoped that every Society will endeavour to make an offer of the services of at least one of its members, and so assist the committee in organising a body of lecturers to whom the Societies may look for help in the not easy task of filling up their programmes. The committee feel that it is perhaps superfluous to intimate that everything should be done to render the visits of these lecturers as pleasant as possible, by receiving and looking after them during the time that they are devoting to the Society whose wants they are attending to. Expenses should, of course, be tendered in all cases. Special allusion is made to the reception of lecturers, because instances of neglect have been brought to the notice of the committee, who feel sure that they have only to briefly refer to the few isolated

cases of negligence to ensure the correct treatment of lecturers in future. Applications for the lectures specified below should be addressed to the Society under whose auspices the offers are made, and the applicant should state what is offered in exchange. It is understood, of course, that the committee accept no responsibility whatever in regard to these offers, and that they may be modified or revoked at the pleasure of the Societies making them.

Offers have been received from the following:—

Blairgowrie and District Photographic Association.—Mr. John B. MacLachlan.

Brentford Photographic Society.—Mr. A. R. Read, jun., on (1) *The First Principles of Pictorial Composition*; (2) *The Practical Side of Pictorial Composition*.

Cornish Camera Club.—The hon. sec. on "Enlarging"; and others.

Dover Sciences Society.—Lectures on Natural History and kindred subjects.

Ealing Photographic Society.—The hon. sec. is prepared to receive any suggestions from other Societies involving reciprocity.

Eastbourne Photographic Society.—Mr. J. J. Hollway, Mr. H. S. Bullock, Mr. Ellis Kelsey, Mr. H. Habgood, and Mr. E. J. Bedford are prepared to lecture.

East Kent Natural History and Photographic Society.—Mr. A. Lander on "Colour Photography," "Telephotography," etc.

Edinburgh Photographic Society.—Suggestions will be considered.

Fakenham Literary, Field, and Camera Club.—The hon. sec., on a variety of subjects.

North-West London Photographic Society.—Mr. Walter Kilbey is prepared to deliver his affiliation lecture on Focal-Plane Shutter Work, and to bring apparatus and additional slides. He also offers the following lectures:—"A Week-end on the Continent," "Through Northern France with a Hand Camera," and "Some Green Bits in the Emerald Isle." Mr. A. J. Reid on "Sunny Memories of Normandy."

Plymouth Photographic Society.—Mr. W. C. Johns on "A System of Lantern-Slide Making by Contact and Reduction."

Rotherham Photographic Society.—Mr. James Leadbeater on "Lightning, and How to Photograph It."

South London Photographic Society.—Mr. Frank Goddard.

Sunderland Photographic Association.—Mr. T. Fitzgibbon Forde on "Trimming, Mounting, and Framing."

West Surrey Photographic Society.—Mr. W. H. Wilshire on "Photography at the Zoo," with slides. Others might be arranged.

Woodford Photographic Society.—Mr. Ernest Marriage, F.R.P.S., on "Architectural Photography." Mr. H. T. Malby, F.R.P.S., on "Flower Photography" (affiliation lecture, with additional notes and slides), and "Rambles through Epping Forest," with slides. Mr. J. P. W. Goodwin on "The Making of Enlarged Negatives." Mr. J. T. Ashby on "Pictorial Composition," with slides.

Woolwich Photographic Society.—Mr. W. H. Dawson on Chemical or Architectural subjects.

PLACES TO PHOTOGRAPH.

The following information has been kindly furnished by the secretaries of the affiliated Societies, and it is hoped that its publication may prove of use to a large number of the members:—

Airdrie.—Monkland Glen, Calder Glen, Cleddans.

Arbroath.—Abbey (free), cliffs, coast scenery.

Beaconsfield (Bucks).—Burnham Beeches, three miles. Stoke Pogis

Church, five miles. Burial Place of William Penn, three miles. Milton's Cottage, Chalfont, four miles.

Birmingham.—The Warwickshire Avon flows through or by the towns and villages of Stoneleigh, Warwick, Stratford, Bidford, Evesham, Pershore, and Tewkesbury, and affords innumerable opportunities for pictorial work. The district teems also with photographic subjects of all descriptions, and not least from an historical standpoint.

Blairstown.—The district is full of "pictures." Cluny Loch, Muirton of Ardblair, Meekleour Village, Craighall House and Grounds are a few of the more important places. Craighall Grounds are open to the public on Tuesdays and Fridays. On other days (Sundays excepted) a permit can be obtained at the Railway Station for a small sum, which is handed by the proprietor to Perth Infirmary.

Brentford (Middlesex).—The River Brent, the Canal, the Thames from Strand-on-the-Green to Isleworth, Greenford, and Perivale. Fine evening effects may be obtained at Isleworth, especially at low tide.

Brierley Hill.—Dudley Castle (free), Halesowen Abbey and Church.

Bury St. Edmunds.—A good photographic district, no prohibitions.

Canterbury.—The Cathedral and town.

Cardiff.—The Castle and Grounds. Permission at the Bute Estate Office (admission 1s.).

Carlisle.—Wetheral, Wreay, Lanercost, the Castle, and Cathedral.

Cheltenham.—Gloucester Cathedral, Tewkesbury Abbey.

Chester.—Eaton Hall (the residence of the Duke of Westminster), Hawarden, the Cathedral, the River, Walls and City, St. John's Church.

Croydon.—Croham Hurst, West Wickham Woods, Addington Hills.

Derby.—Chatsworth, Haddon, the Peak District, Dovedale, Lichfield Cathedral, Darley Dale, and Matlock.

Dudley.—The Castle and Grounds (free).

Dundee.—Arbroath, Abbey and Cliffs, Fife Coast, St. Andrews.

Eastbourne.—Michelham Priory, Hurstmonceux Castle, Parish Church (Norman work), Alfriston and Valley of the Cuckmere, Beachy Head, Cliffs, and Birling Gap.

Exeter.—Cathedral, Bishop's Palace and Deanery, Rougemont Castle, Powderham Castle, old churches, old buildings, and halls. River scenery on Exe, Teign, Daw, and Dart. Country residences, Dartmoor, Teignmouth, Dawlish, Exmouth, Torquay.

Fakenham.—Walsingham Abbey Ruins, five miles (G.E.R. Station at Walsingham). Apply to H. Lee-Warner, Esq., J.P., The Abbey, on Wednesdays only. East Barsham.—Fine specimen of a Tudor Manor House, three-and-a-half miles; apply to W. R. H. Garland, Esq., The Manor House, East Barsham. Thorpland Hall, two miles.—Tudor, with very fine chimneys. Apply to Rev. J. Lee-Warner, at the Hall. Houghton St. Giles, four miles, one mile from Walsingham Station.—The Church contains a fine old illuminated rood screen. A beautiful little wayside Chapel, now belonging to the Benedictine order, later decorated style of 14th century; formerly a resting-place for pilgrims on their way to the shrine of Our Lady of Walsingham. Apply, for Church, to Rev. H. A. Wansborough, Rector of Walsingham. Great Snoring, four miles.—Fine ornamental brickwork of Rectory; built by Sir Ralph Shelton. Apply to Rev. R. P. Roseveare, Rectory, Snoring. Various old manor houses and picturesque river scenery. Particulars from secretary at any time.

Glenalmond (Perthshire).—The Perthshire Highland, the Sma' Glen, many ancient monuments, Crieff, Dunkeld, Falls of Menzie, etc. No permits required.

Hove.—Alfriston, Bramble, Barcombe Mills, Shoreham Harbour, up the Arun from Arundel, the country round Bosham, some good Churches

in neighbourhood, especially Old and New Shoreham (Norman). Apply to the Vicar.

Ipswich.—Particulars of excursions gladly supplied by the secretary of the Ipswich Society.

Isle of Man.—Numerous Glens, the best being Glen Maye, Glen Auldyn, Sulby, Ballaglass, Dhoon, Glen Helen, and upper parts of Grondle. Fine coast scenery between Port St. Mary and Peel (including the Calf of Man), at Garwick Beach, and from a rowing boat between Laxey and Dhoon.

Isle of Wight.—Throughout the island.

Kingston-on-Thames.—The river, Hampton Court and Park, Richmond Park, Oxshott Common.

Leicester.—Bradgate Park and Ruins.

Newcastle-on-Tyne.—Jesmond Dene, Tynemouth, River Tyne and shipping, the Upper Tyne, and surrounding country.

Oxford.—The various colleges and halls, churches, and museum. Panoramic views of Oxford from the cupola of the Sheldonian Theatre and the roof of Bodleian Camera.

Ramsgate.—Seascapes, and, at a short distance, Canterbury, Minster, Sandwich. Cattle studies in the Marshes. Permission readily obtainable.

Rotherham.—Roche Abbey, seven miles, open to public on Monday and Thursday. Conisbro' Castle, eight miles, open daily; no fee except to inside of Norman Keep, which contains two notable fireplaces and chapel.

St. Albans.—The Abbey (apply the Dean), Hatfield House (very special permit only), town and neighbourhood rich in architectural and natural beauties.

Severn and Wye.—The Wye Valley from Ross to Chepstow.

Slough.—Burnham Beeches, Windsor Castle (Inspector Stephens, at the Castle), Eton College (the Bursar), Stoke Poges, Dropmore.

Southport.—The streets, parks, and gardens, and Ormskirk, Sefton (old church), Parbold, Appley Bridge.

Southsea.—By road: Porchester Castle (ruins) and Norman church (permit of vicar). Hayling Island.—Good landscape work and Early English church. Bosham.—Quaint old fishing village (Early English church). Titchfield.—Place House, Leigh Park. By rail: Southampton.—Docks, shipping, yachts, and the Solent. Beaulieu.—Abbey ruins; the New Forest. Netley.—Abbey ruins and beautiful surrounding country. Bursledon.—Good shipping studies at low tide. Winchester.—Cathedral, Castle, Cross, and old streets. Chichester.—Cathedral (Red Book.) Market Cross and old gates. The Canal and Goodwood. Arundel.—The Castle and Deer Park (permit of Duke of Norfolk). Views on River Arun. Bognor and Littlehampton. Cowdrey Castle (ruins), and beautiful country round. Midhurst, Petersfield, Rogate, Harting, and the South Downs. By water: Shanklin, Ventnor, Newport, Ryde, and Cowes. Bournemouth and Southampton. Fine shipping and yachting views. Portsmouth and Southsea teem with places and objects of historic interest, new and old battleships in harbour, the Town Quay (fishing boats and colliers). No camera is allowed in Portsmouth Dockyard without an order from the Admiral Superintendent.

Stonehouse (Devon).—St. George's Church (apply Vicar), Royal Naval Hospital (apply Inspector-General), Royal Marine Barracks (apply Officer in Command).

Stratford (London, E.).—Epping Forest, Wanstead Flats and Park, Whipps Cross, Waltham Abbey (permit from Vicar), Waltham Cross, and Temple Bar.

Sunderland.—The Docks and shipping.

Swansea.—Old castle of Oystermouth, Pennard, Penrice, etc., the Gower Peninsula and coast.

Tunbridge Wells.—Penshurst Place, Hever Castle, Chiddingstone Ruins, Bayham Abbey, and the Commons.

Weymouth.—Portland, Radipole, Moreton, Lulworth, etc.

York.—The Minster, St. Mary's Abbey, the City Halls and Bars, Kirkham Abbey, etc.

The following information is compiled from various sources. The secretary will be glad to be notified of any inaccuracies:—

London and District:

Bethnal Green Museum.—Secretary, Science and Art Department, South Kensington, S.W.

Botanical Gardens, Regent's Park.—The secretary.

British Museum. The Chief Librarian. Applications must specify the objects to be photographed, and the name and address of the photographer.

Bushey Park.—Production of Red Book.

City Companies' Halls.—The respective Clerks.

Green Park.—Production of Red Book.

Greenwich Park.—Production of Red Book.

Guildhall.—City Lands Committee, Guildhall, E.C.

Guildhall Art Gallery.—Library Committee, Guildhall, E.C.

Hampton Court Park, Gardens, and Green.—Production of Red Book.

Hyde Park.—Production of Red Book.

Highgate Woods.—Production of Red Book.

Houses of Parliament.—Lord Chamberlain's Office, House of Lords, S.W.

Imperial Institute.—The secretary.

Kensington Gardens.—Production of Red Book.

Kew Green.—Production of Red Book.

Kew Gardens.—The Director. Photographing is not allowed on Sundays, Christmas Day, Good Friday, and Bank Holidays.

Kilburn, Queen's Park.—Production of Red Book.

National Gallery.—The Director. Professionals only are allowed to photograph.

Natural History Museum Gardens.—Production of Red Book.

Parliament Square Gardens.—Production of Red Book.

Primrose Hill.—Production of Red Book.

Parks and Open Spaces under the control of the London County Council.—No permission is required for the use of hand cameras. The London County Council, Spring Gardens, S.W., grants permits for twelve months for the use of stand cameras.

Public Record Office.—Secretary, Public Record Office, Chancery Lane, W.C.

Regent's Park.—Production of Red Book.

Richmond Park and Green.—Production of Red Book.

St. Bartholomew's Church, Smithfield.—Fee, 2s. 6d.

St. James's Park.—Production of Red Book.

St. Paul's Churchyard.—Production of Red Book up to 12 noon.

South Kensington Museum.—Secretary, Science and Art Department, South Kensington, S.W.

Tate Gallery.—The Keeper, National Gallery of British Art, Millbank, S.W.

Tower of London.—The Constable of the Tower.

Victoria Tower Gardens.—Production of Red Book.

Zoological Gardens, Regent's Park.—Upon production of the Red Book for current year.

Provinces:

Aston Hall, Birmingham.—Mr. Whitworth Wallis, Art Gallery, Birmingham.

Beverley Minster.—The Rector.

Burnham Beeches.—Production of Red Book.

Cambridge College.—The Masters or Fellows, except for Trinity College, where the book at the Porter's Lodge is signed.

Chatsworth House.—The Duke of Devonshire.

Chepstow Castle.—Admission 4d.

Christchurch Priory.—The Rector.

Coulsdon Common.—Production of Red Book.

Farthingdown.—Production of Red Book.

Fountain's Abbey.—Fee, 1s.

Haddon Hall.—Fee 6d., in addition to admission fee.

Hardwick Hall, Derbyshire.—The Duke of Devonshire.

Hastings Castle.—Fee 3d.

Jervaulx Abbey, Yorks.—Admission 6d., no restrictions.

Kenley Common.—Production of Red Book.

Little Moreton Hall, Cheshire.—Fee 1s.

Ludlow Castle, Shropshire.—Entrance fee of 4d. covers photography.

Manchester, Cheetham's Hospital and Library.—The Master.

Oxford Colleges.—The Master or Dean.

Raglan Castle.—Fee for photographing 2s. 6d., and admission fee 6d.

Lectures on the following subjects will, it is hoped, soon be ready for circulation:—

The Management of Photographic Chemicals. By Mr. Thomas Bolas.

The Ozotype Process. By Mr. Thomas Manly.

Photo-Micrography. By Mr. T. E. Freshwater, F.R.P.S. Negotiations for lectures on the following topics are in hand:—

The Selection of a Printing Process.

The Processes of Colour Photography.

Zoological Photography.

Composition, Light, and Shade.

Platinotype Printing.

Stereoscopic Photography.

Gum-Bichromate Printing.

The copyright in the above lectures is the property of the Affiliation of Photographic Societies. It is impossible to secure the regular and satisfactory lending of the lecture unless the regulations indicated below are strictly complied with. Secretaries of affiliated Societies are, therefore, in their own interest, asked to give them their very careful attention.

Lectures and slides are lent to affiliated Societies on the following conditions:—

1. That they shall not be copied, printed, or published, but shall be read or shown before the Society on the date fixed for the purpose, and shall be forwarded to the address and in the manner indicated by the secretary of the Affiliation.

2. That the accompanying slides or examples are repacked securely in the order in which they are intended to be shown, and that any injury which they may have received previous to reception, not already indicated, be at once notified to the secretary, and the attention of the carriers called to the injury, if such appear to have occurred in transit.

3. That no letters or communications intended for the secretary be inclosed with the lecture.

4. That when it be necessary that one slide remain long on the screen the light be lowered to lessen the risk of damage.

THE AFFILIATED SOCIETIES.

Royal Photographic Society of Great Britain. Aldershot and District Camera Club. Arbroath Amateur Photographic Association. Architectural Association Camera and Cycling Club. Ashton-under-Lyne Photographic Society. Beaconsfield Camera Club. Birkenhead Photographic Association. Birmingham Photographic Society. Blairgowrie and District Photographic Association. Bolton Mutual Photographic Society. Borough Polytechnic Photographic Society. Brentford Photographic Society. Brierley Hill Camera and Field Club. Brixton and Clapham Camera Club. Bromsgrove School Photographic Society. Burnley Camera Club. Bury St. Edmunds Camera Club. Cardiff Photographic Society. Carlisle and County Amateur Photographic Society. Cheltenham Amateur Photographic Society. Chester Society of Natural Science (Photographic Section). Chiswick Camera Club. City and Guilds of London Technical College, Finsbury Photographic Society. Cornish Camera Club. Cripplegate Photographic Society. Croydon Natural History and Scientific Society (Photographic Section). Derby Photographic Society. Derby School Photographic Society. Devonport Camera Club. Dover Sciences Society. Dudley Camera Club. Dundee and East of Scotland Photographic Association. Ealing Photographic Society. Eastbourne Photographic Society. East Kent Natural History and Photographic Society. Edinburgh Photographic Society. Exeter Camera Club. Fakenham Literary, Field, and Camera Club. Farnham Royal Photographic Society. Glasgow Photographic Association. Glenalmond Photographic Club. G. E. Ry. Mechanics' Institution (Photographic Section). Hackney Photographic Society. Hamstead Scientific Society (Photographic Section). Hastings and St. Leonards Photographic Society. Hove Camera Club. Isle of Man Camera Club. Ipswich Scientific Society (Photographic Section). Isle of Thanet Photographic Society. Isle of Wight Photographic Society. Kingston-on-Thames and District Photographic Society. Leicester and Leicestershire Photographic Society. Liverpool Amateur Photographic Association. London and Provincial Photographic Association. Mid-Cheshire Society of Art. Monklands Photographic Society. Newcastle-on-Tyne and Northern Counties Photographic Association. North Lindsey Camera Club. North Middlesex Photographic Society. Northampton Natural History and Field Club (Photographic Section). North-West London Photographic Society. Oxford Camera Club. Photographic Club. Photographic Society of Ireland. Plymouth Photographic Society. Polytechnic Photographic Society. Preston Scientific Society (Photographic Section). Redhill and District Camera Club. Richmond Camera Club. Rotherham Photographic Society. St. Albans Photographic Society. Severn and Wye Amateur Photographic Association. Sheffield Photographic Society. Southampton Camera Club. South London Photographic Society. Southport Photographic Society. Southport Y.M.C.A. Camera Club. Southsea Amateur Photographic Society. Stonehouse Camera Club. Sunderland Photographic Association. Swansea Photographic Society. Thornton Heath Photographic Society. Tunbridge Wells Amateur Photographic Association. West Surrey Photographic Society. Weymouth Photographic Society. Widness Photographic Society. Wolverton Literary and Scientific Society (Photographic Section). Woodford Photographic Society. Woolwich Photographic Society. Yorkshire Philosophical Society (Photographic Section).

COLONIAL PHOTOGRAPHIC SOCIETIES.

Amateur Photographic Association of Victoria. Dunedin Photographic Society. Hawke's Bay Camera Club. Maritzburg Camera Club. Northerr

Tasmanian Camera Club. Photographic Society of India. Photographic Society of New South Wales. Queensland Amateur Photographic Society. South Australian Photographic Society. Wellington Camera Club.

PHOTOGRAPHIC SURVEY AND RECORD OF SURREY.

(INAUGURATED MAY, 1902.)

OBJECT.—“The work of the association shall be to preserve, by permanent photographic process, records of antiquities, anthropology, buildings of interest, geology, natural history, passing events of local or historical importance, portraits of notable persons, old documents, rare books, prints, maps, and scenery, so as to give a comprehensive survey of what is valuable and representative in the county of Surrey.”—Rule 2.

PRESIDENT :

The Right Hon. Viscount Midleton, Lord Lieutenant, County of Surrey.

VICE-PRESIDENTS.

The Right Hon. C. T. Ritchie, M.P.

H. C. Leigh-Bennett, M.P.

Sir Frederick L. Cook, Bart., F.R.G.S., D.L., M.P.

Charles Ernest Tritton, M.P.

John Burns, M.P., L.C.C.

Percy Melville Thornton, M.P.

R. K. Causton, M.P.

J. Macdonald, M.P.

T. J. Macnamara, LL.D., M.P.

Wm. Keswick, M.P., J.P., D.L.

Edward J. Halsey, C.A., J.P., Chairman Surrey County Council.

Alderman Howarth Barnes, J.P., Mayor of Battersea.

Col. Samuel B. Bevington, V.D., J.P., Mayor of Bermondsey.

W. Scott-Scott, J.P., Mayor of Camberwell.

N. Page, J.P., Mayor of Croydon.

A. F. Asher, J.P., Mayor of Guildford.

C. Burgess, J.P., Mayor of Godalming.

J. White, LL.D., J.P., Mayor of Lambeth.

W. E. St. L. Finny, M.D., J.P., Mayor of Kingston-upon-Thames.

F. Redman, J.P., Mayor of Southwark.

RULES.

1.—This Association shall be called “The Photographic Survey and Record of Surrey.”

2.—The work of the Association shall be to preserve, by permanent photographic process, records of antiquities, anthropology, buildings of interest, geology, natural history, passing events of local or historical importance, portraits of notable persons, old documents, rare books, prints, maps, and scenery, so as to give a comprehensive survey of what is valuable and representative of the county of Surrey.

3.—The Association shall consist of photographic and other societies and individual members, with a president and vice-presidents.

4.—Societies, or individual candidates, for election as members, shall be proposed by any member or delegate. The election is vested in the council, and the subscription shall be two shillings and sixpence per annum for each delegate sent by a society, and member.

5.—The business of the Association shall be transacted by a council, which shall consist of a chairman, local vice-chairman, hon. secretaries (survey and general), hon. treasurer, hon. curator or curators, not more than two delegates from each associated society, and not less than six ordinary members.

6.—The annual general meeting shall be held in March, when a report and audited statement of accounts for the year ending December 31st preceding shall be submitted, and the president, vice-presidents, officers, and auditors, and non-delegate members of the council shall be elected for the ensuing year. Voting shall be by ballot. Nominations shall be in writing and signed by at least two members, and shall be in the hands of the hon. general secretary seven clear days before the meeting; but societies shall elect their own delegates.

7.—At every general meeting, the chair shall be taken by the president, or, failing him, by a vice-president, or, if no vice-president be present, the chairman shall be appointed by the meeting.

8.—Meetings of the council shall be held quarterly, and at such other times as may be necessary. Five shall form a quorum. The council shall have authority to appoint special committees with power to add to their number.

9.—In the event of the death or resignation of any officer or other member of the council, the council shall have power to fill the vacancy, except in the case of a delegate of a society, when that society shall appoint a successor.

10.—*Photographs (including lantern slides) shall be approved by the council before acceptance. Prints must be sent in unmounted, or on the regulation mounts.

11.—These rules shall be altered only at an annual meeting, or at a special meeting convened for the purpose, and notice of any alteration shall be sent out with the circular convening the meeting fourteen clear days before the date thereof.

12.—The general secretary, by direction of the council, or on the written request of not less than ten members, specifying the business, shall convene a general meeting, not later than four weeks after receipt of such direction or request.

NOTES.

(a) *The copyright of a photograph remains the property of a contributor, unless specially ceded to the Association.

(b) A register will be kept by the hon. survey secretary of the names and addresses of contributors who are willing to sell or supply copies of their prints to those applying for them.

COUNCIL:

Chairman: W. Whitaker, B.A., F.R.S., F.G.S.

Local Vice-Chairmen: Hector Maclean, F.G.S., F.R.P.S., President Croydon Camera Club; J. Bulbeck, Vice-President West Surrey Photographic Society.

Hon. Treasurer: W. W. Topley, 3, Marlborough Road, Croydon.

Hon. Curator: L. Stanley Jast, Chief Librarian, Croydon Public Libraries.

Elected Members: W. Watts, M.A., Prof. of Geology, University of Birmingham; J. J. H. Teall, M.A., F.R.S., P.G.S.; Prof. J. W. Judd, C.B., LL.D., F.R.S., F.G.S.; H. Keatley Moore, B.A., B.Mus.; Councillor J. Noaks; G. W. Moore; C. L. Faunthorpe; J. H. Baldock, F.C.S.; A. Roods; G. Clinch, F.G.S.; Alderman F. Foss, J.P.; E. Mawdesley, B.A., LL.B., Town Clerk, Croydon; J. Epps, jun., F.L.S., President Croydon Nat. Hist. and Scientific Society.

Delegated Members: B. H. Winslow, E. L. Curtis, Norwood Natural Science Society; W. Wood, W. H. Rogers, Thornton Heath Photographic Society; E. Gane Inge, E. W. Eele, Haslemere Nat. Hist. and Micro. Society; E. Salt, H. M. Bennett, Croydon Camera Club; N. F. Roberts, F.G.S., Croydon Nat. Hist. and Scientific Society; R. Hovenden, F.S.A., S. W. Kershaw, M.A., F.S.A., Brit. Arch. Association; M. S. Giuseppi, F.S.A., W. Bruce Bannerman, F.S.A., F.G.S., Surrey Arch. Society; A. C. Haddon, F.R.S. (Pres.), J. Gray, B.Sc., Anthropological Institute; E. A. Martin, F.G.S., Croydon and Norwood Branch Selborne Society; C. Thwaites, Sutton Photographic Club; H. W. Monkton, F.L.S., F.G.S., W. P. D. Stebbing, F.G.S., Geologists' Association; G. R. Beckett, G. Robinson, South Norwood Photographic Society; W. H. Wilshire, West Surrey Photographic Society; R. Quick, M.I.S., Dulwich Scientific and Literary Association; H. G. Quarterman, Society of Architects; F. W. East, Kingston-upon-Thames and District Photographic Society; J. J. Coleman, F. Sears, Clapham Junction Y.M.C.A. Natural Science Circle; W. Coomer, W. J. Wilson, Croydon Y.M.C.A. Camera Club; F. R. Taylor, E. W. M. Wonnacott, Architectural Association Camera and Cycling Club; J. M. Hobson, M.D., B.Sc., Croydon Antiquities Protection Committee.

Hon. Secretaries: Survey, H. D. Gower, 55, Benson Road, Croydon; General J. M. Hobson, M.D., B.Sc., 1, Morland Road, Croydon.

PHOTOGRAPHIC CLASSES AT THE LONDON POLYTECHNICS.

THE prospectus of five of the London Polytechnic Institutes at which winter classes in photography are held are appended, and we give the necessary particulars for the information of those of our readers who may be desirous of taking advantage of the facilities afforded for gaining a knowledge of photography by class study:—

LONDON COUNTY COUNCIL SCHOOL OF PHOTO-ENGRAVING AND LITHOGRAPHY.

(Abstracted from the Prospectus.)

The object of the school is to give instruction in the craft of producing surfaces for printing. Of the various classes held, some are concerned with the more artistic side of the work, others with the technical; there is, however, no real line of demarcation between the two, either in intention or practice, and the division is made solely for convenience of teaching. Instruction is given in the most important photo-mechanical processes, block proving, elementary photography, photographic copying, general lithography, map and plan drawing, transfer writing, design, lettering, and drawing.

The school is open to those who are genuinely engaged in business in any branch of the photo-mechanical, photographic, designing, lithographic, engraving, printing, and book illustrating crafts, and no provision whatever is made for amateurs. In some cases the classes are confined to those who are directly engaged in the particular branch taught. The Technical Education Board of the London County Council is open to consider applications from parents who intend placing their sons as apprentices to any of the above trades, and who may be desirous of giving them the advantage of a preparatory school training; but it is to be understood that such students must be duly apprenticed within some period to be arranged.

The practical instruction given is not intended to replace workshop

training, but is preparatory or supplementary to it, and has also for its object the giving to those engaged in one particular department of a craft a knowledge of allied branches, which, in the ordinary course of trade, they cannot obtain. The lecture courses are for the purpose of explaining more fully the technical principles and details of the various processes than is convenient during the conduct of the practical classes.

The school is excellently equipped with the necessary appliances for study and practical work. It contains a large photographic studio, with two cameras, and powerful electric light installation of the most modern pattern, two dark-rooms, sensitising room, glass cleaning and intensifying rooms, tri-coloured dark-room, extensive etching and printing rooms—complete with electric light and all modern appliances—collotype preparation and printing rooms, with three presses and all necessary equipment, a photogravure room, and a reading room and museum of specimens and examples. There are also two large rooms for lithographic drawing, and a press room, as well as separate studios for design, antique and life and costume drawing.

Attention is called to the following new classes:—Photogravure, Proving. Preparation of originals for reproduction.

SYLLABUS.—EVENING CLASSES.—PHOTOGRAPHY.

The course of instruction deals with the production of negatives and positives required for the various photo-mechanical processes, and also for the reproduction of pictures, etc., by the usual photographic printing methods, as carbon, platinum, and silver. Beginners are required to join the elementary class, in which they receive instruction in the technology and practice of ordinary negative making and silver printing, and, later, in wet collodion photography as far as the making of line negatives from simple subjects. When they have mastered the technique of this class, which is elementary, they should take more difficult work in line negative making, as provided for in the advanced class, where, in addition, is taught the making of ordinary negatives (continuous tone) from originals in monotone, such as are required for the various light printing processes (carbon, platinum, silver), and for collotype, photogravure, etc. In this class both wet and dry plates are used, and instruction is also given in the preparation of collodion. For students who have passed through these courses, and who are sufficiently advanced, arrangements will be made for demonstrating the method of copying originals in colour by orthochromatic methods, using gelatine plates and collodion emulsion. The class in screen negative making is confined to those who have a good knowledge of photographic methods (including wet plate work); and as the number of students that can be dealt with is comparatively small, preference is always given to those who are engaged in branches of process work where a knowledge of screen negative making will be directly and practically useful. The work of the various classes will be progressive, but, in order to help those who join after the opening of the terms when the classes commence their work, demonstrations will be given of the various processes on the first class night in each month, after which students will be able to work by themselves under the teachers' guidance.

Line and Continuous Tone Negative Making.—Beginners.—Teacher: The Principal (*pro tem.*).—Camera manipulation. Preparation of necessary solutions. Making ordinary negatives on dry plates of drawings and objects in relief. Manipulations in lighting, exposure, development, and finishing. Printing from the negative. Principles of wet collodion photography. Preparation of the silver nitrate sensitising bath. Glass cleaning. Coating. Sensitising. Exposing and developing. Intensifying. Stripping negatives.

Advanced Line and Continuous Tone Negative Making.—Teacher: The Principal.—This course will deal with the more difficult branches of the line negative work and the making of ordinary negatives, such as are required for the varying contact light printing processes, as carbon, platinum, and silver, and for enlarging and collotype. The work is principally copying, but as far as is practicable, objects in relief will be dealt with. Instruction is given also in the making of transparencies for negative reproduction and for photogravure, and in printing by the albumen, silver, platinum, and bromide processes. The processes employed are wet collodion, collodion emulsion, and gelatine plates. The students are required to show that they have sufficient knowledge to enable them to profit by the instruction given. The class is confined to eight students.

Screen Negative Making.—Teacher: The Principal.—This course deals with the making of negatives by means of ruled cross lines and irregular grain screens. The work is a special department of negative making, and the class will be confined to those who are engaged in branches of process work where a knowledge of these methods will be directly and practically useful. In order to give greater facility for practice, the class hours have been extended. As it is important that operators should possess a knowledge of the printing processes for which their negatives will be used, it is strongly urged that all who have not this qualification should endeavour to obtain it, and for this purpose they are advised to join the special classes.

TRI-COLOUR PROCESS WORK AND COLOUR PHOTOGRAPHY.

A scheme of instruction in the above subject has been arranged in conjunction with the Northampton Institute, Clerkenwell. The work will be divided into two portions: the first, which deals with the theoretical branches and the preparation of the colour filters, will be undertaken by the Northampton Institute; while the practical work of negative and block making will be carried on at Bolt Court. Although these courses are to a certain extent independent, it is hoped that students will endeavour to attend both. Very complete arrangements have been made at the Northampton Institute for demonstrating, in a strictly practical manner, the various principles underlying tri-colour work, and excellent photographic equipment will be at the disposal of students.

Tri-colour Block Making.—This course will be confined to those who are practically engaged in business in process block work, either as screen negative makers, printers, or etchers. The practical work will consist of tri-colour screen negative making direct from the original, and also by the usual indirect method, transparency production, block making, finishing, and proving. Students who have no knowledge of etching are advised to join the enamel etching class, and those who cannot make screen negatives should join a negative making class. The class is limited to twelve students, and those who wish to join must make application in writing to the Principal.

The instruction will be given on Tuesday and Friday evenings, between 7 and 9.30. The following is the course of work, which extends over the whole session from September to June: Explanatory introduction to the process. The arrangement of apparatus. Preparation and testing of light filters. Making the negatives from a coloured original by the direct and indirect processes. Preparation of transparencies and screen negatives. Printing on metal. Etching and fine etching. Proving.

For the first part of the course, on Friday evenings, the tuition will be given at the Northampton Institute, where special arrangements for the work are made. Later, the Friday evenings will be devoted to work in the etching room at Bolt Court. On Tuesday evenings throughout the

session the work will be carried on in the studio and dark-rooms at Bolt Court. Students joining the course after the commencement will be required to take up the work at the stage at which they find it. Each worker will, it is hoped, be able to complete at least one example, carrying out the various stages of the process himself.

Tri-colour Process Work.—A course of lecture demonstrations with practical work will be given on Friday evenings, at the Northampton Institute, commencing October 3rd. Tri-colour process work is now being rapidly taken up for colour illustrations, and its advantages in some respects are being realised. In order, however, to produce satisfactory results in an economical manner, great care is necessary in the preparation of the colour screens and the making of the negatives. Not only so, but due regard must be paid to the proper selection of the printing inks, and to the making of the blocks and printing therefrom. The object of the course is to give process workers a general account of the methods in use, and to point out the best conditions for obtaining correct colour representations with the minimum of hand work.

Colour Measurement and Photography, and the Theory of Tri-colour.—Lecturers: Mr. A. J. Bull and Mr. Newton.—Syllabus.—Colour measurement.—Introduction. Nature of white and coloured light. Selective absorption. Primary pigment colours and primary colour sensations. Tri-colour theory of vision. Work of Young, Helmholtz, Maxwell, Koenig, and Abney. Colour patch apparatus. Methods of plotting colour luminosity curves and measuring colours.

Principles of Colour Photography.—Theories of the two classes of tri-colour methods. Explanation of Ives' and Joly's processes. Testing of colour filters. Explanation of Lumière's process and tri-colour printing; difficulties of correct rendering of colour by tri-colour half-tone, true printing colours, errors of registration, order of printing.

Practical work.—All students who wish to follow clearly the lecture course should attend the laboratory class held on the same evening. The laboratory work at the Northampton Institute will consist of the production and spectroscopic testing of the colour filters and pigments, and the arrangement of the camera and lighting and production of the continuous tone negative. Students should familiarise themselves with the use of the spectroscope, colour top, and tintometer, and will have an opportunity of measuring and comparing and specifying colours. At the Bolt Court School screen negatives and blocks are prepared, and the necessary finishing, mounting, and proving of the blocks will be carried on. The instruction, however, at this school is reserved for those who are engaged in the photo process trade.

PRINTING AND ETCHING PROCESSES.

In this section instruction is given in the most important photo-mechanical processes. The various workrooms are well-fitted and furnished with all the necessary appliances for practical work, and the students have full opportunity given to them for obtaining a good knowledge of any process included in the section to which they desire to devote their attention. As far as is practicable, students may practise in the etching rooms when they are not in use for class instruction. Application should be made to the Principal for permission.

Line Blocks on Zinc, Brass, and Copper.—Teacher: Mr. F. Lamb.—The course deals with the making of relief blocks on zinc by the "roller" and "powder" processes. Laying tints. Rush work. Relief blocks for book-binders.

Tone, Blocks on Zinc, Brass, and Copper.—Teacher: The Principal (*pro tem.*).—This course is for the purpose of giving instruction principally in the enameline (or "fish glue") process, and its application to the pro-

duction of half-tone blocks in zinc, copper, and brass, but albumen, dry enamel, and other methods will also be shown. Each student is taught printing and etching, but those who require special instruction in one etching should join the class held for this purpose.

Fine Etching.—Teacher: Mr. J. M. Johnstone.—In this class instruction is given in fine etching and finishing half-tone blocks. Students may take this course by itself, or in addition to the other etching classes. It is strongly recommended to those who wish to learn fine etching that (if they have not already had some artistic training) they should devote some time to drawing. Each student is required to provide himself with brushes. Demonstrations for new students on the first Wednesday in each month. A section will be devoted to advanced students, and special attention given to vignetting.

Collotype and photo-lithography.—Teacher: Mr. J. T. Butterfield.—This class deals with the making of the collotype plate with printing from the same, and with the production of photo-lithographs by the direct and transfer processes. The classrooms are fitted with all the necessary appliances for teaching the process, and the students have full opportunity for regularly practising the various operations. The class hours are from 7.30 to 9.30 on Tuesday evenings, but those who are able may also come for practice between 7 and 9.30 on Thursday evenings, by obtaining permission from the Principal. It is also required that all members of the class shall make themselves practically acquainted with the exposing of collotype plates, and for this purpose they may attend the school on Saturday afternoon or some other time during the day by arrangement. In addition to the work in the school, students will be given full opportunity of acquiring a knowledge by actual practical experience of the working of a collotype power machine. Upon such occasions the instruction will be given on Saturday afternoons, instead of Tuesday evenings.

Proving.—Teacher (to be appointed).—Demonstrations will be given, showing the conditions necessary for line and fine half-tone proving. The machinery required: Hand press, machine presses; the ink, the paper. Underlaying, overlaying. Proving vignettes. Proving in colour.

Photogravure.—Teacher (to be appointed).—Principles of Intaglio etching. Making the negative. Sensitising the tissue. Making carbon transparency. Retouching. Graining the copper. Transferring to copper. Drying the film. Stopping out. Etching fluid. Etching the plate. Retouching copper after etching. Proving. Steelfacing.

The preparation of originals for reproduction.—Teacher (to be appointed).—Qualities required. The working-up of negatives, transparencies, silver prints. Bromide or black and white prints. "Half-tones" or engravings. Defective drawings. Catalogue illustrations. The use of the air brush.

Half-tone process work.—Lecturer: The Principal.—A course of six lecture demonstrations with practical work will be given on Friday evenings, from February 27th to April 3rd inclusive, from 8 to 9.30 p.m. This course will give the simplest possible exposition of the scientific principles underlying half-tone work, and also an account of the best practical methods and plant to be employed, the object being to give students engaged in merely one branch a knowledge of the process as a whole.

Lecture demonstrations.—Syllabus.—Object of breaking up continuous tone into line and dot for relief printing. Mechanical methods of converting bas-relief into line and dot. Use of V tool. Optical methods of breaking up. Use of cross-line screen. Conditions for securing true optical V. Influence of width of screen ruling. Shape of stop. Distance of screen and sensitiveness of plate on the result. Practical details concerning process cameras, lenses, and accessories. Lighting. Exposure and development. Preparation of blocks. Printing, etching, etc. Fine

etching. Finishing blocks. Routing. Details of mounting and finishing machinery. Choice of paper and printing.

Time table of evening classes, L.C.C. School of Photo-engraving and Lithography.—Monday.—Screen negative making, 7 to 9.45; line blocks, 7 to 9.30; colour, 7 to 10. Tuesday.—Lithography, 7.15 to 9.15; tri-colour blocks, 7 to 9.30; collotype, 7.30 to 9.30; preparation of originals, 7 to 9.30. Wednesday.—Advanced line negative, 7 to 9; fine etching, 7 to 9.30; photogravure, 7 to 9.30. Thursday.—Lithography, 7.15 to 9.15; elementary line negative, 7 to 9.30; half-tone etching, 7 to 9.30; proving, 7 to 9.30. Friday.—Tri-colour lectures, 8 to 10; half-tone process lectures, 8 to 9.30. Saturday.—Colour, 2 to 4.30; the school is open from 4 to 4.30 for practice.

THE GOLDSMITHS' INSTITUTE, New Cross, S.E.

During the session 1902-3, on Friday evenings at 8.30, a series of twenty-six lectures and demonstrations on the theory and practice of photography will be given.

Students attending this course will be able, if desired, to sit for the City and Guilds' Examination in May, 1902, and the whole course of the above lectures will be in accordance with the City and Guilds' Syllabus. Fee for the six months' course, 7s. 6d. (exclusive of the City and Guilds' examination fee). In addition to the above, there will be the following practical courses, in which each student receives individual instruction:—

Monday afternoons, from 2.30 to 5, a special course of twelve indoor and three outdoor practical lessons for ladies only. Fee for the course, 10s. 6d.

Monday evenings, from 6.30 to 9, a special course of twelve indoor and three outdoor (Saturday afternoons) for ladies only. Fee for the course, 10s. 6d.

Tuesday evenings, from 7 to 10, a course of twelve indoor and three outdoor (Saturday afternoons) practical lessons in elementary photography for gentlemen. Fee for the course, 10s. 6d.

Wednesday evenings, from 7.30 to 10, a course of 24 lessons in photo-mechanical processes, photo-lithography, collotype, half-tone blocks, and photogravure. Fee for the six months' course, 12s. 6d.

Thursday evenings, from 7.30 to 10, an advanced course of twelve practical lessons, comprising enlarging in bromide, making enlarged negatives, carbon, platinum, and gum-bichromate printing, &c. Fee 10s. 6d.

The photographic studio and dark rooms are very completely equipped, and are fitted with electric arc lamps for copying and portraiture. The department is provided with studio, landscape, lantern-slide, and copying cameras, an enlarging lantern, and a powerful electric projection lantern. It also has complete outfits for photo-lithographic and collotype work, for platinotype and carbon printing, and for retouching and other branches of modern photographic practice. Students must provide their own sensitive paper and plates, but all chemicals and apparatus required will be furnished by the Institute. Since the photographic classes are necessarily limited in number of students, applicants will be accepted in order of application. Should a sufficient number of applications be received, other classes will be held on separate evenings.

THE BATTERSEA POLYTECHNIC, Battersea Park Road, S.W.

Teacher of Photography.—Mr. E. Senior.

Elementary (twenty-five lessons.—Lectures: Tuesdays, 7.30 to 8.30 p.m.; students, 4s.; amateurs, 6s. Practical: Tuesdays, 8.30 to 10 p.m.; students, 7s.; amateurs, 10s.

Advanced (thirty lessons).—Lectures: Thursdays, 7.30 to 8.30 p.m.; students, 5s.; amateurs, 7s. 6d. Practical: Thursday, 8.30 to 10 p.m.; students, 10s.; amateurs, 12s.

The Advanced Course prepares students for the City and Guilds' Examinations.

The new regulations of the City and Guilds' Institute require students to pass a local practical examination before admission to the written examination in the Ordinary Grade.

The photographic department contains a large studio, fitted with Joel arc lamp and reflector, for photographic work at night; two commodious dark rooms, lit with electric lanterns and fitted up with every convenience for work. The equipment includes an $8\frac{1}{2}$ by $8\frac{1}{2}$ studio camera and lens, and 10 by 8 copying camera, fitted with Zeiss lens; an electric light enlarging apparatus with ten-inch condenser; a complete set of carbon and platinotype printing apparatus, and a special camera for lantern-slide making, so that ample provision exists for practical work. The classes are primarily intended for trade students, but others are admitted upon payment of higher fees.

Students will be provided with necessary chemicals and apparatus free of cost, but must provide their own plates, sensitive paper, &c.

Students who desire to gain a thoroughly sound knowledge of the science connected with photography are strongly advised to join a chemistry class, and to attend the lectures on light.

Syllabus.—Elementary.—Lectures on principles of photography, the camera and detached parts, the dark room and fittings, use of camera, plates, exposure lenses, developers, defects, intensifiers, printing and toning, practical work in dark rooms, and instruction in taking and copying with electric light.

Advanced Lectures.—The studio, portraiture, lighting the model by daylight and electric light, use of screens, diffusers, &c.

The Dark Room.—Illumination of, and methods for testing safety of light.

Negatives.—Exposure of gelatine plates under every condition of light, subject, &c.; use of exposure tables, meters, &c.

Development.—Nature of development; the various substances in use, and their relative advantages and disadvantages.

Intensifying and Reducing.—Both wholly and locally; the preparation of gelatine emulsions; composition of, and defects in, gelatine plates.

Optics.—The construction and use of photographic lenses; testing lenses; preparation and use of colour screens for isochromatic photography; use of shades and instantaneous shutters; testing speed of shutters.

Colour Sensitometry.—The various forms of apparatus devised by Sir William Abney for adjusting the light filters for use in orthochromatic and three-colour photography.

Photography in Colours.—Ives's, Joly's, Lippmann's, and diffraction processes.

Cameras.—Various forms and their use; camera stands; testing cameras.

Landscapes.—Choice of position, direction of light, &c.; use of view-meters.

Printing.—Printing in silver, carbon, and platinum, including vignetting; printing in clouds, &c.

Toning and Fixing.—Theory and practice of, with formulæ for various solutions.

Retouching and Spotting.—Mounting prints; theory and practice of the wet-plate process, both negative and positive.

Elementary Photographic Chemistry.—Simple test for ordinary photographic chemicals.

Enlarging.—General principles involved, and calculations in enlarging or reducing to scale.

Practical Classes.—Instruction will be given in negative-making, contact printing on bromide paper, silver, and platinum printing, general studio work, and lantern-slide making; wet-collodion process; single and double transfer carbon printing; artigue printing; and in the use of Dr. Albert's orthochromatic collodion emulsion.

Enlarging.—A special class in enlarging will be held on Tuesdays, 8.30 to 10 p.m. Fee for 10 lessons, 9s.; half course, 6s. An electric light enlarging apparatus has been added, and students joining this class will receive individual instruction in making plain and vignettéd enlargements on bromide papers, and in modifying the colours of prints by toning.

THE NORTHAMPTON INSTITUTE.

The City Polytechnic, St. John Street Road, E.C.

Tri-colour Process Work and Colour Photography.—The following special lecture and practical courses for photo-process workers and general photographers have been arranged in co-operation with the London County Council School of Photo-engraving and Lithography, Bolt Court, E.C.

Tri-colour Process Work.—Lecturers: Mr. Charles W. Gamble (Bolt Court School), and Mr. A. J. Bull. A course of 12 lecture demonstrations with practical work, on Friday evenings, from October 4 to December 20 inclusive.

Lecture Demonstrations, Fridays, 7 to 8 p.m. Syllabus.—General introduction, nature of white and coloured light, absorption and reflection of colours, primary spectrum colours, and "primary" pigment colours, Maxwell's colour vision curves, choice of pigments and screens for tri-colour work, influence of order of printing, use of ruled screens, preparing sensitive plates, best conditions of lighting and using the camera, production of the negative, general outline of the production and treatment of blocks, selection of paper, printing.

Practical Work.—Laboratory work, Northampton Institute, Fridays, 8 to 10 p.m. Photo-process work, Bolt Court School, Tuesdays, 7 to 9.30 p.m. Only those engaged in the process trade can be admitted to the practical class at the Bolt Court School in accordance with the rule in the tri-colour class.

Colour Photography and Measurement.—Lecturer: Mr. A. J. Bull. A course of 7 lecture demonstrations with practical work, on Friday evenings, from January 10 to February 21 inclusive, as a continuation of the preceding course. The course is further intended for professional photographers and others having a good knowledge of ordinary photographic work, and who desire to become familiar with colour photographic processes.

Lecture Demonstrations, Fridays, 7 to 8 p.m. Syllabus.—Nature of white and coloured light, principle and use of spectroscope, Maxwell's colour-vision curves, addition and subtraction of colours, making and testing of colour screens, colour sensitiveness of photographic plates, orthochromatising choice and testing of dyes for orthochromatising

Absorption Methods.—Explanation of Ives's, Joly's, and Lumière's processes and their working. Kramskop and other viewing arrangements.

Interference Processes.—Lippmann's process and its explanation; recent developments of Lippmann's process.

Primary and complementary colours, formation of all colours from

primary colours, peculiarities of colour vision and colour blindness. Lovibond's tinto meter, explanation and mode of use, measurement of colours and classification of pigments.

Half-tone Process Work.—Lecturer: Mr. Charles W. Gamble (Bolt Court School). A course of 6 lecture demonstrations with practical work at the Northampton Institute, on Friday evenings, from February 28 to April 11, 1902. The object of this course is to give the simplest possible exposition of the scientific principles underlying half-tone work, and also an account of the best practical methods and plant to be employed.

Lecture demonstrations, Fridays, 7.15 to 8.15 p.m.

Syllabus.—Object of breaking up half-tone into line and dot for relief printing, mechanical methods of converting bas-relief into line and dot, use of V tool, optical methods of breaking up, use of cross line screen, conditions for securing true optical V, influence of width of screen ruling, size and shape of stop, distance of screen and sensitiveness of plate on the result, practical details of process cameras, lenses, and accessories, lighting, exposure, and development, preparation of block, exposure, etching, &c., finishing blocks, fine etching, routing, details of finishing and printing machinery, choice of paper and printing.

Practical Work.—Laboratory work, Northampton Institute, Fridays, 8.15 to 9.30 p.m. Photo-process work, Bolt Court School, Mondays and Wednesdays, 7 to 9.30 p.m.

Fees.—Members or Associates, 10s.; non-members, 15s., for the three courses. Members or Associates, 4s.; non-members, 5s. 6d., for any single course. Particulars of the work carried on at the L.C.C. School of Photo-engraving can be had on application to the Principal of the school at 6 Bolt Court, Fleet Street, E.C.

PHOTOGRAPHIC TRADES SCHOOL, Regent Street, London.

In the area of Greater London the Photographic School of the Polytechnic holds the honourable record that a far greater proportion of those engaged in the various sections of the trade are present or past students of the School than is the case with any other industry and its corresponding school.

Subject.—Negative making; Developing; Camera manipulations; Exposures; Selection and use of lenses; Copying; Orthochromatic work; *Portraiture: Studio designs, Lighting (daylight and artificial); *Landscapes, architecture, &c. Teachers, Mr. Howard Farmer and several specialist lecturers. Tuesday, 8 to 10 p.m. Fee (5 months), 7s. 6d.

Subject.—Preparation of negatives for printing; Intensifying and reducing; Gelatino-chloride printing; Collodio-chloride printing; Albumen printing; Enamelling, mounting, and finishing; Platinum printing; Carbon printing. Teacher, Mr. Francis T. Beeson, F.R.P.S., Photographer to George Newnes, Ltd. Friday, 8 to 10 p.m. Fee (5 months) 10s. 6d.

Subject.—Bromide printing; Enlarging; Enlarged negative making; Lantern-slide printing. Teacher, Mr. John H. Gear, F.R.P.S., winner of over 100 medals at Exhibitions. Monday, 8 to 10 p.m. Fee (5 months) 10s. 6d.

Subject.—Retouching (elementary and advanced). Teacher, Mr. Wolfgang Arndt, Head Retoucher to chief London firms. Wednesday, extra class on Friday, 7.30 to 9.30 p.m. Fee (3 months) 10s. 6d.

Subject.—Finishing in black-and-white (elementary, advanced, and air-

* Practical instruction in these sections obviously cannot be given in the evening but full and detailed instructions for working will be given by special men, and the exposed plates can be developed and finished in the Class,

brush). Teacher, Mr. W. H. Windridge. Tuesday, extra class on Thursday, 7.30 to 9.30 p.m. Fee (3 months) 10s. 6d.

Subject.—Finishing in colour and miniature painting. Teacher, Mr. W. H. Windridge. Monday, 7.30 to 9.30 p.m. Fee (3 months) 10s. 6d.

Subject.—Photogravure (elementary and advanced). Teacher, Mr. Howard Farmer. Wednesday, 8 to 10 p.m. Fee (5 months) 10s. 6d.

Subject.—Line negative making (wet collodion and dry plate); Screen making (wet collodion and dry plate); Line blocks (zinc and copper); Tone blocks (zinc and copper). Teacher, Mr. Guy Simmons (five years with the Swan Engraving Company). Wednesday, extra class on Friday for advanced students, 7.30 to 9.30 p.m. Fee (5 months) 10s. 6d.

Subject.—Tri-colour photography. Teacher, Mr. Guy Simmons. Monday, extra class on Tuesday, 7.30 to 9.30 p.m. Fee (5 months) 10s. 6d.

NOTES.—Special detailed syllabus may be had on application. Personal inquiries at the Institute for information connected with the Photographic School should be made in the Photographic Department. Mr. Farmer will be glad to meet students, &c., by appointment, any evening. The above class fixtures may be subject to alteration.

THE CITY AND GUILDS EXAMINATIONS.

THE following particulars relating to the City and Guilds Examinations in photography in 1903 are extracted from the official handbook:—

PHOTOGRAPHY.

The examination in photography will consist of two parts: Section A., Pure Photography; and Section B., Photo-Mechanical Processes. Candidates may be examined in *either* of these two sections.

ORDINARY GRADE.

The examination in the Ordinary Grade of either section will consist of *a practical and a written examination.*

No candidate will be admitted to the written examination who has not previously passed the practical examination.

To enable candidates to qualify for the written examination in the Ordinary Grade, local practical examinations will be held at convenient times in the session preceding the written examination. A practical examination may be held in any town where there is a class registered by the Institute, or in such other places, distant ten miles from the class, where *at least* five candidates notify, through the Local Secretary, their wish to be examined. The local examinations will be held under the personal supervision of examiners nominated by the local authority, subject to the approval of the Institute. The date at which a local examination is to be held may be fixed at any time between January 1 and March 1 that may be arranged between the Secretary of the Local Committee and the local examiner, provided that *at least fourteen days' notice* is given to the Institute of the date fixed for such local examination; and the Local Secretary will be required to forward to the Institute, within eight days after the holding of such examination, under the signature of the local examiner, the names of any candidates who may have satisfied the examiner of their practical knowledge of photography. The subjects of the test are given in the Syllabus of each section.

The candidate for the practical examination in either section may elect to make his negative in collodion or gelatine, and his print may be produced by any of the methods in ordinary use. He will also be allowed to supply, if he so desire, his own apparatus, chemicals, &c., or he may use

those provided by the local examiner. The fee for the practical examination only will be 2s. 6d. The fee for the written examination is 1s.

SECTION A.—PURE PHOTOGRAPHY.

1.—*Syllabus.*

(1.) The local practical examination will include the following tests:—
To focus, expose, and develop a negative of a person or landscape; to print, tone, fix, and mount an ordinary print.

(2.) The written examination will include questions on such subjects as the following:—

1. The elements of photographic optics; the photographic camera and its adjuncts, lenses, diaphragms, shutters, shades, &c.

2. A general knowledge of the practice and theory of the wet-plate process.

3. The practice and theory of the gelatine dry-plate process, exclusive of emulsion-making; the composition of, and defects in, gelatine dry plates; the defects of gelatine negatives, their causes and remedies.

4. Various methods of developing, fixing, intensifying, and reducing negatives, with a general knowledge of the chemicals employed.

5. Silver printing by print-out processes, including vignetting and printing in clouds, toning, and fixing; contact printing and gelatino-bromide paper.

6. Retouching and spotting; mounting prints.

7. The lighting of the dark room.

8. The studio and lighting of the sitter.

SECTION B.—PHOTO-MECHANICAL PROCESS.

(1.) The local practical examination will include the following tests:—
To focus, expose, and develop a negative of a drawing in line or wash; to prepare or etch a zinc or copperplate (a) for a process block (b) for a photogravure plate; to make a collotype plate or a photo-litho transfer.

(2.) The written examination will include questions founded on the following subjects:—

1. Cameras and lenses for copying and process work, ruled screens, prisms, reversing mirrors, the appliances in ordinary use for electric and artificial lighting for photographic purposes, and the apparatus employed in photo-mechanical processes.

2. A practical knowledge of collodion (wet and dry), and gelatine dry plate photography.

3. A general knowledge of various methods of developing, fixing, intensifying, and reducing negatives.

4. A general knowledge of the properties of gelatine, albumen, fish-glue, bitumen, resin, inks, etching solutions, and other chemicals and materials used in photo-mechanical work.

The principles and practice of at least two of the following processes:—

5. Photogravure.

6. Block making—line, half-tone, and three-colour.

7. Photo-lithography.

8. Collotype.

The written examinations in the Ordinary and Honours Grades will be held on Wednesday, April 23, from 7 to 10 p.m.

HONOURS GRADE.

Candidates for Honours in either section must have previously passed in the Ordinary Grade of that section.

The Honours Examination is both written and practical.

The fee for the Honours Examination (written and practical) in either section is 3s. 6d.

For the year 1902, practical examinations will be held in London only, unless ten candidates at least apply to be examined in the same section (A or B) at some other centre.

SECTION A.—PURE PHOTOGRAPHY.

(1.) Written Examination.—Candidates will be expected to answer more difficult questions in the subjects for the Ordinary Grade, and, in addition, a knowledge will be required of:—

1. The theory of the photographic image, of development, fixing, intensification, and reduction.

2. The theory of light as applied to photography, including a general knowledge of spectrum and orthochromatic photography.

3. The principle of photographic optics.

4. The theory and practical use of sensitometers for testing the speed and gradation of plates, and also their uses in printing processes.

5. The principles and practice of the preparation of gelatino-bromide and gelatino-chloride emulsions.

6. Collodio-bromide emulsions—their preparation and use.

7. Platinotype and carbon printing; other methods of printing with bichromates and with iron salts; enamels.

8. Enlargements and lantern slides.

9. Application of photography to scientific and technical purposes.

(2.) Practical Examination.—Candidates will be required to show proficiency in conducting, in presence of the examiner, any of the following practical operations:—

1. To develop gelatino-bromide plates previously exposed (correctly or otherwise) by the examiner.

2. To reduce or intensify gelatino-bromide negatives.

3. To print, tone or develop, fix, and mount a silver, platinotype, or carbon print.

4. To test a sample of glass or fabric to be used in lighting the dark room.

5. To test the sensitiveness and gradation of a plate.

6. To find the focus of a lens either corrected or uncorrected, or to examine a lens as to its suitability for different photographic purposes.

7. To copy a drawing or engraving.

8. To make an enlargement from quarter-plate.

9. To make a lantern slide by contact or in a camera.

The practical examination will be held on Saturday, April 26, between 2.30 and 6.30 p.m., and at other times if found necessary.

(3.) Specimen Work.—Candidates will also be required to send in, not later than April 16, not fewer than three nor more than six negatives, not less than quarter-plate size nor more than whole-plate, together with mounted prints made from each of them by any ordinary photographic printing process or processes that the candidate may select. The negatives and prints must be accompanied by a statutory declaration made by the candidate to the effect that the selection of the subjects and the whole of the work (except the manufacture of the plates, sensitive paper, and mounts) involved in the production of the negatives and prints has been done by the candidate without assistance from any other person, and within the twelve months preceding the date of the examination. Forms for the declaration may be obtained from the Institute.

SECTION B.—PHOTO-MECHANICAL PROCESSES.

(1.) Written Examination.—Candidates will be expected to answer more difficult questions in some of the subjects of the Ordinary Grade, and, in

addition, to show a practical knowledge of the principles and operations in one or more of the following processes:—

1. Photogravure.
2. Line negatives and line blocks.
3. Half-tone negatives and half-tone blocks.
4. Chromotypography (negatives and blocks for three-colour process).
5. Photo-lithography. 6. Collotype.

(2.) Practical Examination.—Candidates may be required to show proficiency in practical operations in one or more of the above processes, numbered 1, 2, 3, 4, 5, 6, including the preparation of negatives suitable for each class of work, from (a) pictures in colour, (b) drawings in monochrome, (c) originals in black and in tints, (d) natural objects.

Candidates in Section B may select the particular branch of practical work in which they desire to be examined.

In order that candidates may know what apparatus and material they will be required to provide for the practical part of the examination in Section B full information as to the practical tests may be obtained from the Local Secretary on Friday, April 25, for the examination to be held on the following day.

The practical examination will be held on Saturday, April 26, between 2.30 and 7.30 p.m., and at other times if found necessary.

II. Full Technological Certificate.—Certificates are awarded on the result of each of the above examinations. For the full technological certificate the candidate must qualify as stated in Rules 41, 42.

III. Works of Reference.—For the ordinary grade: "Instructions in Photography," Abney (Sampson & Co.); "Ilford Manual of Photography," Bothamley; "Science and Practice of Photography," Chapman Jones (Iliffe); "Wet Collodion Photography" C. W. Gamble (Hazell, Watson, & Viney); "Art and Practice of Silver Printing," Abney and Robinson (Sampson Low & Co.); "Materia Photographica," Leaper (Iliffe). For honours, in addition to the foregoing (Section A): "Optics of Photography," Traill Taylor; "Chemistry of Photography," Meldola (Macmillan); "Treatise on Photography," Abney (Longmans); "The Chemical Effect of the Spectrum," Eder; "La Photographie," by A. Davanne (Paris); "Collotype," by Abney and Clark (Sampson Low & Co., London). For reference: "Traité Encyclopédique de Photographie," Fabre (Gauthier-Villars); "Ausführliches Handbuch der Photographie," Eder (Knapp); "Handbuch der Photographie," H. W. Vogel (Oppenheim); the "Dictionary of Photography," Wall and Bolas (Hazell, Watson, & Viney); the "Annals of Photography," in *Photography Annual*. Section B: "Modern Heliographic Processes," Ernest Lietze (Nostrand Co., New York); "Collotype and Photo-Lithography," Schnauss (Iliffe); "Photogravure," Wilkinson (Iliffe); "Photo-engraving, Half-tone Enamel Process," Whittel (Scovell Co., New York); "The Half-tone Process," Verfasser (Percy Lund); "Half-tone on the American Basis," Cronenberg and Gamble (Percy Lund); "Photo-engraving," Farquhar (Dawbarn & Ward); "Photo-lithography," Fritz and Wall (Dawbarn & Ward).

THE OPTO-TECHNICAL SECTION OF THE NORTHAMPTON INSTITUTE, CLERKENWELL.

(Abstracted from the Annual Volume of Educational Announcements.
—Ed.

OPTICAL AND SCIENTIFIC INSTRUMENTS.

THE lectures in this course are intended for opticians and optical instrument makers who have already had a good training in elementary optical

theory. Those who have not had such a training should attend the course on Applied Optics, either simultaneously or as a preliminary course, and only those will be admitted to this more advanced course who can satisfy the head of the department that they are qualified to profit by the instruction.

Laboratory and Calculations Classes, which are an essential part of the course, have been arranged, and all students will be expected to attend them. In addition, instrument makers should attend one evening per week in the workshop.

(a) Measuring Instruments (Four Lectures, from 22nd September to 13th October, 1902).—Measuring machines, dividing engines, and comparators, their construction and use; standards of length; cathetometers; chemical and physical balances, their construction and testing; chronographs for accurate time measurements; compensation for temperature.

(b) Mathematical and Surveying Instruments (Five Lectures, from 20th October to 17th November, 1902).—Simple compasses and miners' dials; prismatic compasses; levels and clinometers; theodolites and sextants; adjustment and testing of surveying instruments; collimation.

(c) Optical Projection Apparatus (Four Lectures, from 24th November to 15th December, 1902).—Construction and mechanical details of various types of optical lanterns; condensers and front lenses; formation of the image; effects of spherical and chromatic aberration and their elimination; projection microscopes. Sources of light; oil, acetylene, oxy-hydrogen, electric, etc.

(d) Telescopes, Opera and Field Glasses (Four lectures, from 22nd December, 1902, to 26th January, 1903).—Optical principles of terrestrial and astronomical telescopes; use of concave and erecting eye-pieces; object glasses; testing qualities of glass, design and construction of object glasses; centring of lenses; Ramsden's and Huyghen's eye-pieces; micrometer eye-pieces, alt-azimuth and equatorial mountings; determination of the magnifying power of a telescope.

(e) Photographic Apparatus (Five Lectures, from 2nd February to 2nd March, 1903).—Construction of cameras and details of adjustments; single landscape lenses, their design and construction, use and calculation of stops; symmetrical, portrait, rectilinear, and anastigmatic lenses; calculation of lens curves; centring of lenses. Testing of photographic lenses, focal length and depth of focus, covering power, distortion, chromatism, astigmatism, flare spot, etc. Types of diaphragms, Waterhouse, Iris, etc. Construction and testing of time and instantaneous shutters. Telephotography.

(f) Microscopes and Objectives (Six Lectures, from 9th March to 20th April, 1903).—Theory of the compound microscope; mechanical construction; English and Continental stands; rack-work and fine adjustments; simple and mechanical stages; sub-stage illuminators; construction and use of ordinary and sub-stage condensers, spot lenses, paraboloids, Lieberkuhns, etc.; binocular microscopes; camera lucida and other accessories; micrometers; objectives of low and high power; their design and construction; centring; correction collars; water and homogeneous immersion objectives; interference and diffraction, and their influence on the resolving power of a lens; Abbe's diffraction theory; testing objectives.

(g) Spectrometers and Polarising Apparatus (Three Lectures, from 27th April to 11th May, 1903).—Construction of chemical spectroscopes; spectrometers and goniometers; direct vision and diffraction spectroscopes; testing and adjusting of spectroscopes; tourmalines; Iceland spar, Nical prisms, selenites; construction of microscope and projection polariscopes, and polarimeters; construction and testing of spar, selenites, and other crystals; cutting and mounting specimens, etc.

THE DESIGN OF OPTICAL INSTRUMENTS.

Lecturer: DR. C. V. DRYSDALE.

This course will be open to students who have already satisfactorily passed through the courses in Applied Optics and Optical Instruments, and who have also a thorough knowledge of algebra and trigonometry. An acquaintance with the elementary principles of the differential and integral calculus will be required later in the course, and may be obtained by simultaneous attendance at the class in Advanced Calculations. Other students will be admitted if they can show evidence of preparedness to profit by the course.

TUESDAYS, 7.30 TO 8.30 P.M.

Syllabus.—Theory of Image Formation.—General conditions for collinear relationship between object and image, coaxial systems, conjugate points; classification of optical systems; optical nomenclature and definitions.

Optical Systems.—First Approximation.—Reflection and refraction at a single spherical surface; conjugate positions; optical centre, focal and symmetrical planes, magnification; absolute and reduced distances and curvatures.

Refraction by single thick lens; conjugate positions; magnification; principal focal and symmetrical planes; Listing's nodal points; position of Gauss points in special cases.

General theory of refracting and reflecting systems; determination of the position of the Gauss points in any system.

Chromatic Aberration.—Chromatic aberration of single thin lens; calculation of thin double and triple achromatic combinations; chromatic differences of focal length and magnification in lens systems; effects in optical instruments; apochromatic combinations.

The Five Aberrations.—Brief discussion of von-Seidel's theory; spherical aberration, coma, radial astigmatism, distortion and curvature of field; von-Seidel's and other expressions for the amount of these aberrations and conditions for removal; the sine law, anastigmatic flattening of chromatically corrected images, new achromats.

Path of Light through Refracting System.—Direct method of calculating the course of a ray through a system; application to photographic lenses and microscopic objectives.

Aperture and Diffraction.—Definition of aperture effects on brightness of image; interference, calculation of width of bands, diffraction by slit, edge, etc.; diffraction patterns, cornu spiral, Babinet's principle; resolving power of grating; diffraction by circular aperture, limit of resolution of an optical system.

Telescope.—O.G.'s design of object glasses; double and triple combinations, compensation for chromatic and spherical aberration, and coma; mounting object glasses; effects of temperature, moisture, etc.; photo visual lenses.

Oculars.—Positive and negative forms, calculation of magnifying power; conditions for achromatism, etc.; erecting eye-pieces; erection by prisms; calculation of aperture of prismatic glasses; general design.

Photographic Lenses.—Design of simple achromatic and spherically compensated landscape lenses; use and position of stop; distortion, double objectives; principle of spherical correction of entrance and exit pupils; curvature of field condition for flattening, new achromats anastigmats, Rudolph's principle, illustrations of modern lenses; convertible anastigmats and their design.

Microscope Objectives.—General principles of construction, short his-

torical account of improvements; immersion objectives, aplanatic points of sphere, principle of Amico; resolving power dependence on aperture, Abbe's diffraction theory and recent developments; examples of modern objectives adjusting and testing.

OPTICAL WORKSHOP.

In conjunction with the course of lectures on Optical and Scientific Instruments, an optical workshop has been equipped for practical instruction in the construction of lenses for various purposes, and for giving students an opportunity of actually verifying the principles of lens design given in the lecture course. In optical matters, proof of the advantage of any special design of lens can only be obtained by actually constructing and testing it, and it is therefore hoped that all those who wish to become proficient in practical optics will attend this course. The instruction will be given by a trade glass worker, under the supervision of the Lecturer in Optics, and as soon as some degree of proficiency in lens working has been attained, the students will have opportunities of designing special forms of lenses, and of practically constructing and testing them. The workshop is already equipped with a number of lathes and tools for grinding spherical lenses of various curvatures, and arrangements are being made to instal special machines for lens grinding and polishing.

TUESDAYS, 7.30 TO 9.45 P.M.

Syllabus.—Roughing, turning, grinding, and polishing simple lenses for spectacles, etc.; centring, edging, and fitting spectacle lenses; grinding and polishing of plane and cylindrical lenses and prisms; determination of axes of cylinders and prisms, mounting of lenses.

Use and properties of the different kinds of crown, flint, and Jena glass; workshop tests of glass for uniformity and optical properties; construction of achromatic combinations, centring and cementing surfaces; making and gauging curves of grinding and polishing tools.

Composition and making of cements, polishing waxes, pitch tools, balsam, etc.; washing and grading emery; use of machinery in grinding and polishing plane, spherical, cylindrical, and spherocylindrical lenses.

Making the optical parts of various optical instruments, object glasses for telescopes, cameras, microscopes, etc.; positive and negative eye-pieces, micrometer eye-pieces, etc.

The workshop is primarily intended for those students who are simultaneously attending the lecture course, but if other applications are received from students who have had the necessary preliminary training, they will be favourably considered if there be room.

CLASSES IN TECHNICAL OPTICS.—APPLIED OPTICS.

The following course is intended as an introduction to the previous course on Optical Instruments, and should be taken as preparatory to that course by all students who have had no previous training in scientific optics. In conjunction with the course on Visual Optics, it also covers the requirements of the full examination of the Spectacle Makers' Company for the Freedom and Diploma of the Company. Candidates for this examination should take the elementary portion of this course, and also the specific portion of Course No. 5 relating to the instrument they select for special study.

In connection with the lectures there is a course of laboratory work on Tuesday evenings, which it is essential that all students should take up, as, without doing so, they cannot hope to make much progress. Students who have no previous mathematical training should also attend the class on Technical Calculations on Friday evenings.

MONDAYS, 7.30 TO 8.30 P.M.

Syllabus.—Nature of light, its velocity and mode of propagation; determination of velocity; formation of shadows; illumination and its laws; photometry and photometers; explanation of the reflection and refraction of light; reflection of plane waves at plane surfaces; theory of spherical waves and surfaces; measurement of curvature; use of spherometer, dioptric system of measurement; reflection of plane and spherical waves at plane and curved surfaces; concave and convex mirrors; theory of conjugate foci.

Refraction and its laws, explanation by wave theory; refraction through parallel plates and prisms; definition and determination of the refractive index; determination of the angle and deviation of prisms, degree and dioptric measurement; refraction at spherical surfaces; use of lenses: conjugate foci; determination of the convergence and focal length of lenses; formation of images by lenses and magnification. Types of lenses:—Double, plane, and meniscus; convex and concave, spherical, cylindrical, and spherocylindrical lenses; determination of prismatic effects of lenses; axes of prisms and cylinders; optic centre; prismatic equivalent of a decentred lens.

Combinations of lenses in contact and separated; theory of thick lenses and systems of lenses; principal focal and symmetrical planes and nodal points; dispersion and achromatism, decomposition, and recomposition of light; index of dispersion, and its determination; spectrometry; achromatic prisms and lenses and their forms; calculation of achromatic combinations; elementary theory of optical instruments, camera, telescope, microscope, etc.; spherical aberration and its effects; formation of focal lines; distortion; aplanatic surfaces and lenses and their calculation; focal surface and depth; interference of waves and its applications; production of interference bands by various methods; diffraction and its effects under various conditions; use of gratings.

Elementary theory of polarisation; production of polarised light by simple reflection and refraction; propagation of waves in crystalline media; ordinary and extraordinary refraction; behaviour of Iceland spar; optic and crystallographic axes; positive and negative, uniaxial and biaxial crystals; construction of Nicol's, Foucault's, and other prisms; interference of polarised light; formation of colours, rings, and brushes, etc.; polarising action of solutions and polarimetry; electro-magnetic theory of light; influence of magnets on polarised light, etc.

Throughout the course the practical applications of the subjects referred to will be specially kept in view, and the course is so arranged as to supply the theoretical knowledge required for the previous courses on optical instruments.

VISUAL OPTICS.

Lecturer: DR. E. CLAUDE TAYLOR, M.D., M.S.

In addition to the last-named course, these opticians who intend to present themselves at the examinations of the Spectacle Makers' Company should attend a course on Visual Optics, which will be given on Tuesday evenings at 7 p.m., and will continue throughout the session. The work of this course will be in accordance with the following official syllabus of the Spectacle Makers' Company:—

TUESDAYS, 7 TO 8 P.M.

Syllabus.—General anatomy of the human eye; the course of light passing through the media of the eye alone, and as modified by spherical

and cylindrical lenses and prisms. Hypermetropia, myopia, astigmatism, presbyopia.

Instruments commonly used for determining the refraction of the eye; trial lenses, test types, astigmatic chart, the optometer. The principle of the ophthalmoscope; the principles of, and various forms of spectacles.

The whole of the practical work necessary for the examinations of the Spectacle Makers' Company will be given in this course, and in the Optical Laboratory in connection with course 75b.

WORKSHOP CLASSES FOR OPTICIANS.

Instructor: MR. R. J. GAGE.

The objects of this class are to give to opticians the necessary experience and manual dexterity to enable them to fit various lenses and alter and repair frames, and also to make up oculists' prescriptions and test the correctness of the work. Instruction will also be given in repairing simple optical instruments.

WEDNESDAY, 7.30 TO 9.45 P.M.

Syllabus.—Centring, shanking, and edging simple spherical lenses.

Fitting lenses to frames.

Shaping bridges of frames to measurements and prescriptions. Adjustment of temples.

Repair of steel and gold frames. Soldering, brazing, and electroplating. Finishing and burnishing frames.

Fitting and adjustment of *pincers-nez*, including ordinary, cylindrical spring, and spring placquet glasses.

Fixing of unrimmed glasses.

Adjustment of cylindrical, prismatic, and bifocal glasses.

Treatment of pebble lenses. Testing axis of pebbles by pebble tester, etc.

Workshop testing of completed glasses.

Repair of opera and marine glasses. Balsaming and burnishing in lenses.

The complete course for opticians is as follows:—

Lectures on Applied Optics, Mondays, 7.30 to 8.30 p.m.; Optical Laboratory Work, Tuesdays, 8.30 to 9.45 p.m.; Visual Optics, Tuesdays, 7 to 8 p.m.; Optical Workshop, Wednesdays, 7.30 to 9.45 p.m.; Practical Calculations, Fridays, 8.30 to 9.45 p.m.

THE CITY OF MANCHESTER MUNICIPAL SCHOOL OF TECHNOLOGY.

PROSPECTUS OF THE DEPARTMENT OF PHOTOGRAPHY AND THE PRINTING CRAFTS.

This department deals so far as is practicable with the most important requirements of the photographic and printing industries.

The work of the department is divided into the following sections:—Photography, lithography, printing, drawing and design, and book-binding.

Photography.—Under the head of photography it is proposed to deal with the subject as a whole, because it is only by a knowledge of the fundamental principles underlying the craft that its special applications can be properly understood.

The photo-mechanical processes which represent an important industrial application of photography will be very fully dealt with, and will form

the most important section of this branch of the work of the department.

In general photography particular attention will be paid to the art and technology of negative making, and more especially to the optical and physical principles which underlie the various methods of procedure, an understanding of which is necessary on the part of those who desire to become good craftsmen, while due consideration will be given to light printing processes, and chiefly to those which may be regarded as types, and which are of importance in the industry.

In lithography the work will be divided into two portions, the one dealing with the production of the printing surface and the other with the printing from the same surface. It is hoped that those who have chosen this branch of work as a calling will not neglect to pay attention to the photo-mechanical processes, having regard to the probable effect, as in the case of wood-engraving, which the advance in these processes is likely to have in modifying methods of picture production.

The letterpress branch comprises composing, press, and machine work, electrotyping and stereotyping. The various branches of compositor's work will be dealt with as fully as is practicable, especial attention being paid to the cultivation of a simple and good style in display work, and to tabular and technical matter, and the arrangement of catalogue text. As well as general press and machine work, the printer will have every facility given to him to study the printing of process blocks. For the electrotyper the careful reproduction of process blocks offers a field of study for which full convenience exists, and it is proper to remark that this branch of work, judging by the results daily seen in practice, has not received that amount of intelligent attention which it deserves.

The binding of editions of books and magazines in one and the same style required for the publication of large editions, is work which can only be undertaken satisfactorily in the workshop, for it is principally a question of the proper use of special machinery. But there is a large and important branch of the binder's business which deals with the book as an individual item—the work of the ordinary hand binder. For such work there must always be a good demand, and it is the purpose of this section of the department to deal with those who are engaged in such craft. Regarding a book primarily as an object of utility, that which makes such object lasting and convenient to use should receive the first attention of a good workman. The final ornamentation which a book may receive enhances its value if made with good taste and judgment, but properly considered, it is only an excellence when accompanied by sound construction. The department will concern itself with teaching the best and soundest methods of forwarding as the first object of importance.

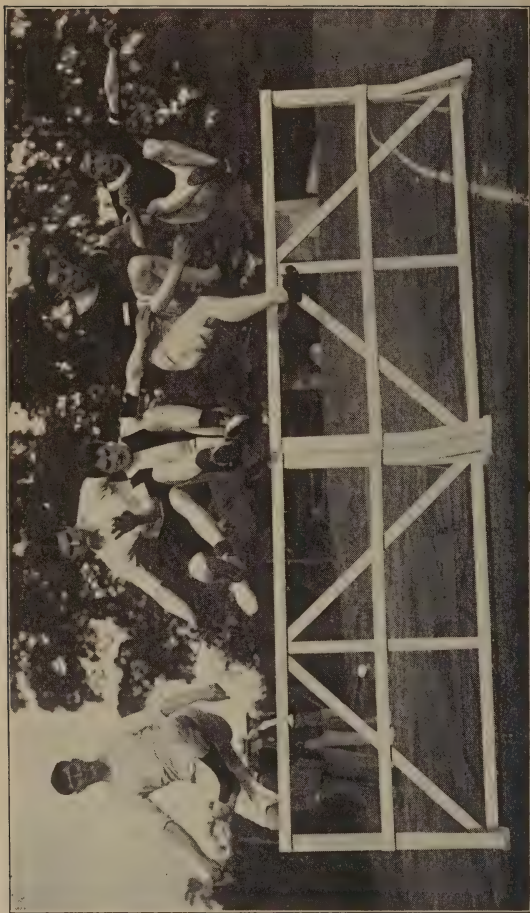
In drawing and design the classes will be arranged to suit the particular needs of those who are engaged in the crafts with which the department deals. In many branches of the industry knowledge and skill in drawing is essential to success. Such knowledge and skill can only come by continual observation and sustained practical study, and it is hoped that students will recognise such methods as the only road to success in this as in any other branch of work. Every effort will be made to make the work interesting, particularly in the training of the observation so as to understand the nature and characteristics of the object to be depicted, which is the essential condition to good and thoughtful draughtsmanship. The work which comes under the head of Design, will be such as is required for the methods of reproduction employed in the printing crafts. It should, however, be recognised that to become a good designer requires the possession of natural qualities, which cannot be given by class teaching, though they may be developed by such. But what is possible is that a student may become properly acquainted with the methods employed in



Ivor Castle]

[Photo

Taken with the **Goerz Anschutz Folding Camera**
and **Goerz Double Anastigmat**
in $\frac{1}{1000}$ th of a second.



W. Kilbey]

Taken with the **Goerz Anschutz Folding Camera** and
Goerz Double Anastigmat in $\frac{1}{1000}$ th of a second.

[Photo.

the craft for which he essays to design. Dealing only with reproduction work there are in every process limitations, some inherent, others only imposed because of economic reasons, without a knowledge of which a man cannot succeed in his work. Such knowledge constitutes a part of the designer's stock-in-trade. The faculty of being able to put this knowledge and the skill acquired to successful use, to be able to produce beautiful and appropriate designs, is, however, an endowment of Nature.

Equipment.—The department contains the following:—Photographic studio, with three dark rooms, photographic enlarging room, etching and collotype preparation room, block mounting workshop with router, power saw, guillotine, bevel planes, etc., lithographic printing room, with machine and four presses, composing room, machine and press room, with two cylinder machines and two platen machines, electrotyping and stereotyping rooms, lithographic drawing and design studio, and bindery. The plant and apparatus constituting the equipment are thus very complete, and have been selected for the purpose of giving sound practical instruction in the principles, technique, and practice of the various crafts concerned. Particular attention has been paid to the general arrangements for work in the various sections. The scheme of instruction includes lecture, class demonstrations, laboratory, and workshop practice. The classes will be held both during the day and evening. The day classes will extend from September 22nd to July 31st, and the evening classes will run from September 29th to the month of May. Short courses of lectures will be given on certain evenings in the week during the summer.

Certain courses of day instruction will be arranged over periods varying from two to three years, which will have for their object the preliminary training of those who desire to enter the various crafts concerned, and such a training may be regarded as preparatory to apprenticeship in a business house.

The department is under the direction of Mr. Charles W. Gamble.

THE YORKSHIRE PHOTOGRAPHIC UNION.

OFFICERS, 1902-1903.

President:—Mr. Percy Lund.

Vice-presidents:—Mr. Godfrey Bingley, Leeds; Dr. Hollingworth, Hull; Mr. J. H. Rowntree, Scarboro'; Dr. Paterson, Sheffield.

Hon. Treasurer:—Mr. Alex. Keighley, F.R.P.S.

Societies Comprising the Union:—Batley Photographic, Bradford Photographic, Brighouse Photographic, Cleveland Camera Club, Dewsbury Photographic, Halifax Camera Club, Harrogate Photographic, Heckmondwike Photographic, Holmfirth Photographic, Huddersfield Photographic, Hull Photographic, Ilkley Photographic, Keighley Photographic, Leeds Camera Club, Leeds Photographic, Pudsey Photographic, Rodley Photographic, Scarboro' Photographic, Sheffield Photographic, Skipton Photographic, Wakefield Photographic, Yeadon Photographic, York Photographic.

Hon. Business Secretary:—Mr. Ezra Clough, 10, Farncliffe Road, Manningham, Bradford.

Lantern Slide Section.—Hon. Sec.:—Mr. W. H. Houghton, King's Mill Lane, Huddersfield.

Print Portfolio Section.—Hon. Sec.:—Mr. W. H. Atkinson, Cemetery Lodge, Batley.

Jury of Selection.—Mr. Godfrey Bingley, Mr. Percy Lund, Mr. Alex. Keighley, F.R.P.S., Mr. Percy Sheard.

LECTURES, 1902.

Secretaries are requested to kindly note the following regulations:—

Invitations to lecture should be sent to the lecturers. Stamped envelopes should, in all cases, be enclosed for reply.

The expenses of each lecturer must be paid to him on the evening of the lecture, and it is expected that the society will provide hospitality, when the return journey is impossible, or inconvenient, on the same night.

Each lecture to be acknowledged in club syllabus as "Yorkshire Photographic Union Lecture."

There is no restriction on the number of lectures which a society may endeavour to secure from this list.

It is understood that the society making the engagement provides the lantern, if required, and that no charge to the public is made for any Union lecture. A reading lamp must always be provided for the use of the lecturer when a lantern is necessary.

Revisions and additions to this syllabus may be necessary from time to time—particulars may be obtained from the hon. secretary.

In addition to lectures, there will be two sets of lantern slides and two portfolios of prints issued by the Union for circulation, dates for which may be arranged with the hon. secretaries of the respective sections.

LIST OF LECTURES, 1902-3.

The figures in parentheses indicate the number of times the lecturer is prepared to repeat his lecture in a session.

Addyman, J. W., 15, East Parade, Leeds. "A Fishing and Camping Tour in Norway."—(2) Lantern required.

Atkinson, W. H., Cemetery Lodge, Batley. "Flower Photography."—(6) Use of backed plates. Isochromatic and ordinary plates. Natural arrangement of flowers. Sundry hints on flower work. Lantern required. 40 or 50 slides.

Bagshaw, Walter, Esq., J.P., Moorfields, Birkenshaw, near Bradford. "Photo-Micrography."—(3) Apparatus—Illumination—Transmitted, reflected, oblique, and critical light—Dark ground effects—Polariscope—Focussing—Exposure—Low power Photography without Microscope—Low, medium, and high powers—use of eye-pieces, bull's eye, iris, diaphragm, substage condenser, oil immersion lenses, etc. Lantern required. 40 slides.

Beanland, Rev. Joseph, M.A., 7, Claremont, Ripon. Choice of the following two subjects (6 or 8):—I.—"Platinotype Demonstration." Development and Modifications (special attention)—Toning and After-treatment. Small gas stove and two whole-plate developing dishes required. II.—"Ruined Abbeys of Yorkshire." Kirkstall, Fountains, Byland, Whitby, Bolton, Gunsborough, Marrick, Rievaulx, Jervaulx, Easby, Mount Grace, Ecclestone, Kirkham, St. Mary's (York), Ellerton. Lantern required. About 100 own slides.

Beevers, W. A., Welcombe, Cleveland Road, Huddersfield. "Platinotype."—Demonstration.—(3) Gas stove, enamelled pan, and 1 by 1 dishes required.

Bourke, R., 7, Marlborough Terrace, Belle Vue Road, Leeds. "Carbon" (single transfer).—(2) A demonstration of the single transfer, with some historical notes. Gas stove, hot and cold water required.

Bingley, Godfrey, Thorniehurst, Headingley, Leeds. Choice of the following seven subjects (6):—I.—"Lantern Slide Making." Making lantern slides by contact and reduction. Developing, printing in clouds,

binding and finishing slides, with a few examples shown on the lantern. Lantern and a few dishes required. 20 or 30 slides. II.—“Warwickshire, Gloucestershire, and the Wye Valley.” Warwick, Kehlilworth, Stratford-on-Avon, Stoneleigh Abbey and Park, Alcester, etc. Gloucester, Tewkesbury, Frampton, Berkeley Castle, etc. Chepstow, Tintern, Raglan Castle, Symond's Yat, Ross, Hereford, etc. Lantern required. About 200 slides. III.—“The Dales and Coast of Yorkshire.” Showing places of interest in Airedale, Wharfedale, Wensley, and Yoredale, Swaledale, etc., York, Beverley, and Ripon Minsters, numerous abbeys, and the coast from the Tees to Bridlington. Lantern required. About 200 slides. IV.—“London to North Cornwall.” Districts shown:—London, Hampton Court, Henley, Salisbury, Winchester, Christchurch, Bournemouth, Swanage, Dorset Coast, Villages in West Somerset, Ilfracombe, Clovelly, Bude, Boscastle, Tintagel, Exeter, etc. Lantern required. About 200 slides. V.—“East Anglia and Adjacent Counties.” Lincoln, Norwich, Yarmouth, Cromer, Beccles, Caister Castle, Stalham Broad, Salhouse Broad, Wroxham, etc., and several interesting districts in the counties of Herts and Bucks. Lantern required. About 200 slides. VI.—“Near the Border, and over.” Durham, Newcastle, Hexham, Alnwick, The Cheviots, Edinburgh, St. Andrews, Arbroath, Stonehaven, “Thurms,” Perthshire, Ayr, Dumfries, etc. Lantern required. 200 slides. VII.—“Oxford and Cambridge.” Oxford, Iffley, the Thames, Abingdon, Dorchester, Henley, Cambridge, Ely, etc. Lantern required. 200 slides.

Burrell, B. A., F.I.C., 5, Mount Preston, Leeds. Choice of the following two subjects:—I.—“Chemicals used in Photography.” II.—“Weights and Measures.” Will give either two lectures of I., two lectures of II., or one of each. Lantern required for II. About 12 slides.

Camp, Sparham, 22, Upper Albert Road, Heeley, Sheffield, Demonstration:—“Negatives and Prints, their modification and improvement.”—(2).

Chapman, E. Heslop, 24, Sholebroke Terrace, Leeds. “Kallitype.”—Demonstration.—(4) Brief sketch of the chemical action of the process, followed by the coating and preparation of the paper—printing—development, etc. Two 12 by 10 dishes, and a small gas stove required.

Crossley, H., Calverley View, Rodley, near Leeds. “Bromide Enlarging.”—(3 or 4). Bromide enlarging for beginners—Negative—Exposure—Paper—Developer and Development—Fixing—Toning, by various processes, including copper—and Mounting. Lantern and dishes required.

Elliff, Philip, 21, Wade Lane, Leeds. Choice of the following two subjects (4):—I.—“Ceramic Photography.” Ceramic photography, with examples of photo, enamels, china, etc., and furnace for firing same. Coal gas supply and few small dishes required. II.—“Burnt-in-Lantern Slides, by the Pepper Process.”—Demonstration. With examples and furnace for firing same. Slides made by this process are absolutely permanent. No cover glass being required, one hundred can be packed in less room than fifty ordinary slides—for Record and Survey work, two very important considerations. Gas supply and few small dishes required.

Heaps, Thomas, 25, Holker Street, Keighley. Choice of the following five subjects (6):—I.—“The Dry Plate: its Development.” A lecture designed to help beginners to understand the chemical reactions and the tools they use in the production of a negative. Lantern required. 40 slides. II.—“Whitby—Photographically.” Lantern required. 100 slides. III.—“Lantern Slide Making, by Contact or Reduction.” Lantern required. 50 slides. IV.—Demonstration—“Gum-Bichromate.” V.—Demonstration—“Ozotype.”

Heywood, Edgar Alan, 15, New Briggate, Leeds. “Light and Lenses.”.... (4) Practical Experiments. Wave and Emission Theory. Spectrum Analysis, Colour Values. Refraction—Reflection. Astigmatism—Lenses (simple and compound). Achromatic and Spherical aberration. Manufac-

ture and grinding of Lenses. Application of the various forms to photography. Lantern required. 50 slides.

Hibbert, T. G., 142, Steade Road, Sharrow, Sheffield. Demonstration—"A Simple Method of Toning P.C.P."—(2).

Hollingworth, J., M.R.C.S., 168, Holderness Road, Hull. "Photomicrography."—(2) Lantern required. About 40 slides.

Holmes, William, 24, Arundel Street, Wakefield. "Wanderings in the West Riding of Yorkshire."—(3) Places of interest in Dentsdale, Chapel-le-dale, Ingleton, Clapham Caves, Ribblesdale, Wharfedale, Airedale, Nidderdale, the Valleys of the Ure, Ouse, and Calder. Lantern required. 150 to 160 slides.

Homburg, Albert, 51, New Briggate, Leeds. Choice of the following five subjects (3) (October, November, and March only):—I.—"Flash-light." (45 slides.) II.—"Trafals in Germany." (130 slides.) III.—"How to Make Lantern Slides." IV.—"Paper and Other Films." V.—"Taking and Making Cloud Pictures." Lantern required for lectures Nos. I., II., IV., and V.

Howdill, Charles B., A.R.I.B.A., 7, Oxford Row, Leeds. I.—"Colour and Colour Photography."—(3) Theory of Light and Colour—Description of the Joly, Sanger, Shepherd and Lumière processes of Natural Colour Photography, illustrated by numerous slides. Lantern required. 50 slides. II.—"Kirkstall Abbey."—(3) A lecture practically illustrating Photographic Record Work, dealt with both historically and archæologically. The majority of the lantern slides being from negatives taken by members of the Record Section of the Leeds Camera Club. Lantern required. 80 slides.

Keighley, Alex., F.R.P.S., The High Hall, Steeton, near Keighley. Choice of the following three subjects (6):—I.—"A Tour Round an Old Garden."—A pictorial subject. Showing the pictorial possibilities sometimes to be found within a very limited area. Lantern required. About 150 slides. II.—"Principles of Art Applied to Photography." The principles of composition, chiaroscuro (light and shade), and general fitness of details and accessories, explained by the aid of numerous illustrations. Lantern required. About 100 slides. III.—"Artistic Mounting and Framing." Dealing altogether with the principles which should guide one in the selection of suitable mounts and frames, illustrated by numerous specimens. Lantern required. About 20 slides.

Laycock, J. W., Westfield, Keighley. Choice of the following four subjects (3) (in October and November only):—I.—"The Rhone Valley, Roman and Revolutionary France." II.—"Western France and the Pyrenees." III.—"The Riviera." IV.—"Tours in Germany, Austria, The Civenes, Italy, Normandy, North Central France." Lantern required. From 40 to 50 slides in each set.

Learoyd, J. Ingham, Rydal Mount, Halifax. Choice of the following seven subjects (6):—I.—"A Run to Norway" (2 hours). II.—"A Scamper on the Continent" (2 hours). III.—"Belgium, Rhine, and Switzerland," part of above (1½ hours). IV.—"Rhine, Switzerland, and Italy, part of above (1½ hours). V.—"Various Continental Views," part of above (1½ hours). VI.—"Home and Foreign Views" (1½ hours). VII.—"Denmark," slides made from photos., prints, etc. (1½ hours). Lantern required. 150 to 200 slides.

Lund, Percy, The Country Press, Bradford. Choice of the following four subjects (6):—I.—"The Woodlands: Trees as a Study for the Sun-Artist." Illustrated with about sixty examples of the lecturer's own work. Apparatus—Best Time of Day—Curious Trees—Beauties of Trees in Detail—A Course of Study for the Novice—The Woodlands at Different Seasons—and under varying atmospheric conditions. II.—"Nature Poets and Nature Pictures." Illustrated by about fifty original lantern photographs, accompanied by selections from poems descriptive and appreciative

of Nature. A Comparison between Photography and Poetry—Study of Poetic Thought a Valuable Aid to Pictorial Expression—Thomson—Gray—Wordsworth—Bryant—Tennyson—Extracts from Nature Poets, illustrated by Photographs. III.—“The Field Days of a Sun-Artist.” With about seventy lantern pictures. How to Envy Sketching with the Camera—Where to Go—Hints on Apparatus—Mistakes of the Amateur Photographer—Wasted Opportunities—Reminiscences of Field Days—Among the Mountains—In Flat Countries—Among the Trees—Rustic Models—Etc. IV.—“The Story of a Streamlet. With about sixty lantern pictures. A Pictorial and Descriptive Record of the Life of a Mountain Streamlet, from its source through varying scenes, to its outlet in the ocean, with photographic and poetic notes. The Spring—The Mountain Tarn—Moss-hags—Over the Granite—“The Place of its Steep Descent”—Cataract—“Here Smoking and Frothing.”—Pastoral Scenes—Alluvial Flat—“Dead Man's Pool”—Orchards—Stepping Stones—The Village Church—Chain of Lakes—Homes of Notable People—The Great Lake—“To Join the Brimming River”—The Mill—Tidal Limits—The Sea.

Lygo, J. Hudson, 16, Parker's Road, Broomhill, Sheffield. Demonstration—Elementary Carbon, for beginners.”—(2) Small gas stove and dishes required.

Mackay, Robert, 69, Albion Street, Leeds. “Bells, and Bell Lore.”—(3) With lantern slides illustrating quaint and curious bells and bell inscriptions.

Margerison, Samuel, Calverley, near Leeds. “What we see in an old Church.”—(4) Description, with lantern illustrations, from a wide area, of the ecclesiastical and architectural features of our village churches. The slides include photographs of many of the rarer objects of interest met with in ancient churches. Lantern required. About 90 slides.

Newstead, P. E., Ecclehill, Bradford. Choice of the following two subjects (4):—I.—“The Light Side.” Illustrated readings from a selection of my humorous writings. Lantern required. II.—“Flash-light Work.” Good and Bad Flash-light Work—Examples in the Lantern—Demonstration—What Developer to use, etc. Lantern required.

Saunders, J. V., M.A., Hymers College, Hull. “Knightly Effigies and How to Photograph Them.”—(2) Historical Sketch of a knight's equipment, with illustrations. Points to be noted and photographed. Photographic notes on subjects shown. Lantern required. About 30 slides.

Shaw, H. Dixon, F.C.S., B.Sc., Bond Street, Dewsbury. Choice of the following four subjects (4):—I.—“Some Experiences in Africa with the Yeomanry.” Lantern required. 150 slides. II.—“Bromide Enlarging.”—Practical demonstration. III.—“Intensification and Reduction.”—Practical demonstration, on both plates and papers. IV.—“Gold Toning, with the Alkali Salts.” Dishes, etc., required for II., III., and IV.

Sheard, Percy, White Lea, Ristall, near Leeds. Choice of the following three subjects (4):—I.—“Cairo to the First Cataract.” Lantern required. 90 slides. II.—“Decorative Photography.” Photographic application to the embellishment of every-day furniture. Suggestions only, of a non-technical character. Lantern required. 20 slides. III.—“The Alteration or Improvement of Negatives.” Brief indications of simple methods, resulting from personal experience. Illustrated by examples in various stages.

Skilbeck, J., 29, Delph Mount, Leeds. “Platinotype,” Hot, Cold, and Brush Development—with Glycerine.—(4) Small gas stove and three whole plate (or larger) dishes required.

Skirrow, J., 9, Cecil Avenue, Bradford. “A Visit to the Fjords of Norway.”—(2) Lantern required. 80 slides.

Stockdale, R., M.A., 17, Mount Preston, Leeds. “Carbon Process Demonstration.”—(3) An elementary demonstration of the working of the

Carbon Process. Sensitising, developing, single and double transfer. Few dishes and hot water required.

Thistlethwaite, Geo., Linton House, Fairweather Green, Bradford. Choice of the following three subjects (4):—I.—“Lakeland, with Cycle and Camera.” II.—“Wensleydale—an Inexpensive Tour with Cycle and Camera.” III.—“1,000 Miles in Wharfedale, with Cycle, Motor Car, and Camera.” Humorous account of how we discovered these parts. Lantern required. About 100 slides each.

Thomas, C., 4, Brighton Grove, Pellon Lane, Halifax (not eligible on Friday evenings). “The Carbon Process.”—(2) Short History—Development of Prints—Sensitising, etc.

Whiteley, Mrs. G. W., Park View, Trinity Street, Huddersfield. “A Tour in the Mediterranean, by two Ladies.”—(2) Slides by Mrs. H. G. Brierley. Lantern required. 60 slides.

THE TELLA PHOTOGRAPHER'S GUIDE TO LONDON.

[Reprinted by courtesy of The Tella Camera Company]

Academy of Arts (The Royal), Burlington House, Piccadilly.—Built by Pennethorne, in 1869. The building is in the Renaissance style, and was designed by Smirke. On its facade are statues of Phidias, Leonardo da Vinci, Flaxman, Raphael, Angelo, Titian, William of Wykeham, Wren and Reynolds. Opens May to August. Admission 1s. The best view is from the street and a morning light.

Achilles Statue, Hyde Park.—Cast from cannon taken in Peninsular War and at Waterloo; was presented by the women of England to the Great Duke of Wellington. Morning. (See Hyde Park.)

Admiralty, Whitehall.—It is here that the official work of the British Navy is conducted. The old part (facing Whitehall) is best in a morning light; the old part (facing St. James's Park) in the afternoon. No permit required for street view, but for the new part see “St. James's Park.”

Albert Hall, Kensington.—Used principally for concerts, and holds 10,000 people. The organ has 8,000 pipes. Built 1867-71. Cost £200,000. Afternoon or evening light. Best view is from the steps of the Albert Memorial, opposite. No permit is required for the hall, but permission is required to ascend the steps of the Albert Memorial. (See Hyde Park.)

Albert Memorial, Hyde Park.—Designed by Sir Gilbert Scott, and erected to the memory of the late Prince Consort, at a cost of £120,000. Morning light required. The best view is from the gate near Albert Hall. Permit same as Hyde Park.

Alexandra Palace, Muswell Hill.—Six miles from King's Cross or Broad Street stations. Now a public park. Concerts, etc., are held. Many pictures are to be had at all hours of the day. No permit to photograph required.

Alhambra, Leicester Square.—The popular place of amusement. Photograph in the afternoon. The best view is from the corner of the Square, or from the Gardens.

Apsley House, Hyde Park Corner.—The residence of the Duke of Wellington, and where the old Duke lived from 1820 to 1852. Morning light is best.

Bank of England, Threadneedle Street.—Covers nearly four acres. Established 1694. Present building erected 1788. The only bank in London which has the power of issuing its own notes. A Guard of Soldiers is garrisoned at night in the Bank for the protection of the huge wealth stored there. A fine view is obtained from the steps of the Mansion House opposite, and morning light is the most suitable.

Battersea Park.—On the Surrey side of the Thames, in the S.W. district. About two hundred acres in extent. It has a pretty sub-tropical garden, which no visitor should fail to photograph. Views may be obtained at almost any hour. Permission may be obtained from Chief Officer, Parks Department, L.C.C.

Bethlehem Hospital, Lambeth Road, S.E.—A lunatic asylum, and generally called Bedlam. The afternoon is the best time to photograph it.

Billingsgate.—The largest fish market in London. A few minutes' walk from London Bridge. Market opens at 5 a.m. It takes its name from Bilin, King of the Britons, who built a water-gate here in 400 B.C.

Blackfriars Bridge.—Built 1864-9. Cost £320,000. A fine view of the dome of St. Paul's is obtained from the Thames adjacent to this Bridge. Views may be obtained almost any time of the day from the warehouses on the south side, or from the Thames Embankment.

Bluecoat School, Newgate Street.—Known as Christ's Hospital, and founded in reign of Edward VI. The dress of the scholars is very characteristic; it consists of a long blue gown, yellow stockings, and knee-breeches. Afternoon light is best for exterior. For permission to photograph apply to Head Master.

British Museum, Great Russell Street, W.C.—Completed in 1845. Contains manuscripts, marbles, bas-reliefs, sculptures, vases, bronzes, coins, gold ornaments, gems, etc., etc. The library contains two million volumes. Museum open (free) daily from 10 to 6, except some departments on Tuesday and Thursday. Sunday, from 2 till dusk. Nearest Underground station, Gower Street. Photograph exterior in morning light. Permission to photograph can be obtained from the Principal Librarian, who will give full particulars. Three or four days' notice is necessary.

Natural History Museum, South Kensington.—Contains Zoology, Geology, Mineralogy, and Botany. Open free from 10 a.m. to dusk. Midday for exterior. Permission to photograph from the Director.

Buckingham Palace, St. James's Park.—Built in 1825, by the order of George IV. The Royal Mews may be viewed by applying to the Master of the Horse. The grand State carriage (built for George III., in 1762) and many other things are worth seeing. Morning light for exterior. For exterior see St. James's Park. For permission to photograph interior views apply to authorities on the spot.

Bunhill Fields.—Open daily from 9 to 4. John Bunyan, Isaac Watts, Daniel Defoe, and many other eminent men are buried here.

Chelsea Hospital.—Built in 1682 by Charles I. In the dining hall and the chapel are battle flags taken by the British in many parts of the world. The gardens are open to the public. Views may be had at almost any hour. For permission to photograph, apply to the officials on the spot.

Chislehurst, Kent.—A pretty town, a short ride from Charing Cross Station. It was here Napoleon III. resided, and died. St. Paul's Cray, a favourite haunt of photographers, is in the district.

Christ's Hospital.—See "Bluecoat School."

Churches.—See Westminster Abbey, St. Paul's, etc., etc.

Cleopatra's Needle, Thames Embankment.—Presented to the nation by Mahomet Ali in 1820. Formerly stood at Heliopolis. It is 68ft. high, and weighs 180 tons. Can be photographed almost any hour of the day.

Colonial Office, Whitehall.—Built 1868, in the Italian style. The public are allowed to view the principal rooms between 2 and 5 p.m., on application to the porters. Late afternoon for exterior. For permit to photograph, ask porter.

Covent Garden Market, off the Strand.—The great London market for fruit, flowers, and vegetables. Busiest hours 6 to 9 a.m.

Crosby Hall, Bishopsgate Street.—A fine old fifteenth-century building; now used as a restaurant.

Crystal Palace, Sydenham.—Seven miles from Victoria or London Bridge stations. The building formerly used for the great Exhibition in Hyde Park (1851). Various exhibitions, etc., are held here. The fireworks on Thursday evenings are a special feature. Cameras are not allowed in the grounds.

Downing Street, Whitehall.—In this street are the official residences of the First Lord of the Treasury and the Chancellor of the Exchequer, etc.

Empire Theatre, Leicester Square.—Similar to the Alhambra, which see.

Epping Forest.—Opened in 1882 as a free public park. It is 5,000 acres in extent. About seven miles from Liverpool Street Station. An ideal spot for lovers of nature; some very fine photographic studies of trees may be obtained. Permission to photograph may be obtained from the Town Clerk, Guildhall, London, E.C.

Finsbury Park, Hornsey.—About 100 acres in extent. Cost £95,000, and opened in 1869. Trains from King's Cross. Permission to photograph from the Chief Officer, Parks and Open Spaces Sub-Department London County Council, Spring Gardens, S.W.

Foreign Office.—Joins the Colonial Office, which see.

Foundling Hospital, Guildford Street, W.C.—Founded 1739, with the object of feeding, clothing, and educating destitute children. These may be seen every Sunday at service in the chapel, at 11 o'clock, and afterwards at dinner. Strangers freely admitted on payment of small donation. The building contains many curiosities, and pictures by Gainsborough, Reynolds, Hogarth, etc. Morning light for exterior. Permission to photograph for interiors.

General Post Office, St. Martin's-le-Grand.—The centre of the English postal system. Best view, for which a wide-angle lens is necessary, is from corner of Newgate Street, after mid-day.

Government Offices, Whitehall.—Built in 1876 from designs by Sir Gilbert Scott. Morning light. Permission to photograph on application.

Gray's Inn, Holborn.—Contains a fine hall built in 1560. Shakespeare's "Comedy of Errors" was played here in 1594. Afternoon light for exteriors. Permission to photograph on application.

Greenwich Hospital and Royal Naval College, Greenwich, S.E.—About six miles from London by boat or rail. The Painted Hall and relics of Nelson are to be seen here. Admission free from 7 a.m. to 5 p.m. Best view in the afternoon, and from the river. Permission to photograph on application at the Hospital.

Greenwich Park.—A most beautiful spot which joins the Hospital mentioned above. Greenwich Observatory is here. Views to be had at all hours of the day. Permission to photograph can be obtained from the Secretary, H.M. Office of Works, 12, Whitehall Place, S.W.

Guildhall, King Street, Cheapside.—Originally built in 1411: damaged by fire, 1666; restored and new frontage added, 1789. Lady Jane Grey was tried in the hall. Mid-day for exterior. For interiors, apply to the Town Clerk, Guildhall.

Hampton Court Palace.—About ten miles from Waterloo Station. Built in 1515 by Cardinal Wolsey, and presented to King Henry VIII. Edward VI. was born here, and Jane Seymour died. Open daily from ten to four, except Fridays. Views at all hours of the day. Permission to photograph must be obtained from the Secretary, H.M. Board of Works, 12, Whitehall Place, S.W.

Horse Guards, Whitehall.—The Life Guardsmen as sentinels are one of the most popular sights of London. The passage under the clock-tower leads to St. James's Park and Buckingham Palace. Good snapshots may be obtained any morning, after ten o'clock, from the street.

Houses of Parliament, Westminster.—Finished in 1857, and cover eight

acres. Cost three millions. Good general views from across the river in the morning, and from Westminster Abbey side in the afternoon. It is necessary to apply for permission for the interior some weeks before it is required. Write to the Secretary, Lord Great Chamberlain's Office, House of Lords, S.W.

Hyde Park.—The most fashionable park in London. Covers 630 acres. Many excellent pictures can be made in this beautiful park. Views may be obtained at all hours of the day. Write to the Secretary, for permission to photograph, H.M. Office of Works, 12, Whitehall Place, S.W.

Imperial Institute, South Kensington.—Foundation-stone laid by Queen Victoria, 1887, and opened by her, 1893. Morning light, and a wide-angle lens necessary.

India Office, St. James's Square.—Here the affairs of the Indian Empire are regulated. Afternoon light. Best view from St. James's Park.

Kensington Palace.—Birthplace of Queen Victoria. William and Mary, and Queen Anne lived here. First made a Royal Palace in 1690. Morning views are the best. Permission to photograph may be obtained from Secretary, H.M. Office of Works, Whitehall Place, S.W.

Kew Gardens.—Beautiful grounds, walks, and houses of tropical plants. Open from ten to sunset. A visit to these beautiful gardens should not be missed. Views at all hours. For permission to photograph apply to the Director. Apply two days before permit is wanted.

Lambeth Palace.—For six centuries this building has been the residence of the Archbishops of Canterbury. Afternoon light. Excellent views from Lambeth Bridge. To photograph the interior, inquire at the gate.

Law Courts, Strand.—The Royal Courts of Justice, opened in 1882. Contains 19 court rooms and 1,106 smaller apartments. A good view to be had from the fire-station near the church opposite, about mid-day. A wide-angle lens is necessary.

London Bridge.—Built in 1831, at a cost of £2,000,000. Best taken in the morning from the top of an omnibus, or from a warehouse window on the south side.

Mall, The.—A celebrated walk in St. James's Park, extending from Spring Gardens to Constitution Hill. See St. James's Park.

Mansion House.—The residence of the Lord Mayor. It was built in 1739. Early morning and late afternoon light suitable. To photograph this interesting spot, the top of a 'bus will be found a good point of vantage.

Marble Arch.—An arch which formerly stood as an entrance to Buckingham Palace. Now at the corner of Hyde Park. See Hyde Park.

Marlborough House, Pall Mall.—Built in 1709, and the London residence of King Edward when Prince of Wales.

Mint, Royal, Little Tower Hill.—Built 1811. Where the coinage for the United Kingdom is produced. Afternoon light for a good view from the street.

Monument, close to London Bridge.—Erected in 1671, to commemorate the big London fire (1666). Cost £13,500. To photograph, a very wide-angle lens is necessary, and an afternoon light.

National Gallery, Trafalgar Square.—Contains nearly 1,500 pictures. Open to the public free daily (excepting Thursday and Friday, admission, 6d.), from 10 to 4 or 7. Good views may be obtained from many points of Trafalgar Square, and at all hours of the day. Apply to Secretary for permission to copy pictures.

Newgate Prison, Old Bailey.—Built in 1770. Will shortly be taken down. Afternoon light, and a wide-angle lens.

Regent's Park.—370 acres in extent. The Zoological Gardens are

situated at the north part of this park. Many fine photographs can be obtained in this beautiful park at almost any hour of the day. For permission to photograph, apply to the Secretary, H.M. Office of Works, Whitehall.

Royal Exchange.—Near Bank and Mansion House. Opened by Queen Victoria, 1844. Admission daily from 9.30 to 1.30. Afternoon light. For permission to photograph the interior, apply on the spot.

St. Paul's Cathedral.—Built by Wren after the great fire in 1666. Good photographs of the west front can be obtained from Ludgate Hill in an afternoon light. For interiors, write to the Dean, The Deanery.

St. Bartholomew's, Smithfield.—One of the oldest churches in London. Built 1132. Only the porch and tower can be taken from the exterior. For permission to photograph the interior (for which a charge of 2s. 6d. a day is made), write to the Vicar, or arrange with the Verger.

Somerset House, Strand.—Built in 1786. Now occupied by Government offices. Best view from Waterloo Bridge. Morning Light. For interior, apply to the Porter at the gate.

South Kensington Museum.—Now called the Victoria and Albert. Cost £60,000. Morning light; wide-angle lens. For interiors, write to the Secretary, Science and Art Department, S.W.

The Temple, off Fleet Street.—Headquarters of the Knights Templars in the twelfth century. The church in the Inner Temple is most interesting. Good views may be had at any time. For permission to photograph, apply to the officials on the spot.

Thames Embankment.—Good views at all times. Best view of the Embankment is from Hungerford foot-bridge.

Tower.—The most historically interesting building in London. Said to have a Roman origin. William the Conqueror built the White Tower. The building is crowded with interesting objects. Views may be had at any time. The best view of the Tower Bridge is to be had from here. For permission to photograph, apply to the Constable.

Tower Bridge.—Opened 1894. Excellent panoramic view of the Thames can be obtained from the top of this bridge. Any hour of the day, but mid-day the best. No permit is required.

Trafalgar Square.—The centre of London. The square was laid out about 70 years ago. Views at all times.

War Office, Pall Mall.—Late afternoon is the best time to photograph. Waterloo Bridge.—Built 1817. Cost £1,000,000. Best view from the Embankment, at mid-day.

Westminster Abbey.—Founded in 1060 by Edward the Confessor. Full of interesting details. Best time to photograph the exterior is the early morning for north side, and afternoon for west front. For permission to photograph, write a week before wanted for form from the Chapter Clerk, The Sanctuary, Westminster, S.W.

Whitehall, opposite the Horse Guards.—King Charles I. was executed here. Afternoon light is best to photograph.

Zoological Gardens, Regent's Park.—Open from 9 a.m. to sunset. Views to be had at all times. For permission to photograph, apply the Secretary, 3, Hanover Square, W.

SOME POINTS IN CONNECTION WITH GOODWILL.

[By an Accountant.]

The expression goodwill is one which is now so frequently used that there is perhaps some apology needed for introducing the subject to the notice of the readers of this paper. There are, however, so many of us to whom

a knowledge of the subject connected with the goodwill of a business may one day or other be useful, that I have ventured to write on the subject.

A definition of goodwill is by no means an easy thing to give—thus we have as the favourite one, “the benefit arising from connection and reputation, the probability of the old customers going to the new firm which has acquired the business,” while Lord Eldon, in *Crutwell v. Lye*, said that “the goodwill of a trade is nothing more than the probability that old customers will resort to the old place.” There are besides these numerous other ones, but the above are perhaps sufficient for our purpose.

Goodwill is a term not only applicable to a trade, but also to a profession, and, indeed, in this latter case, it is often the most valuable asset of the concern.

On purchasing, or negotiating with a view to purchasing, a business, it will nearly always be found that an amount will have to be paid for the goodwill of the concern, and as this is not a tangible asset, it is at once asked in what way the figure is arrived at. The circumstances of each individual case can alone be taken as our guide, but it is generally conceded, as pointed out by Mr. L. R. Dicksee, F.C.A., in his excellent treatise on the subject, that the following circumstances must exist, and that the person to whom the goodwill passes must in all cases have:—

1. The right to carry on business at the same place as that at which it was formerly carried on.
2. The right to use the old name, and to represent himself as the legitimate successor of the former proprietors.
3. Exclusive right to so represent himself.

As might be imagined, No. 3 has been fruitful of much litigation, but it was finally settled by the House of Lords in *Truro v. Hunt* [1896] App. Ca. 7, that “Where the goodwill of a business is sold (without further provision), the vendor may set up a rival business, but he is not entitled to canvass the customers of the old firm, and may be restrained by injunction from soliciting any person who was a customer of the old firm prior to the sale to continue to deal with the vendor, or not to deal with the purchaser.” It is obvious, therefore, that the purchaser should be careful to protect himself from the competition of the vendor by entering into express stipulation with the vendor, binding him not to compete within certain limits.

The attitude of the retiring partner or partners is of very real value in estimating the value of the goodwill; *e.g.*, can they assist, and will they do so, to make the new undertaking successful? will they oppose it? or are they incapable of doing either? Your actual position is one of great importance in determining the amount you should pay for the goodwill; thus, if you are becoming a partner in place of one who is retiring altogether from business, it is much more valuable than if you were merely taking the place of a partner who was expelled, for in the first case you would suffer no disadvantage by reason of the outgoing partner, but, on the contrary, would probably reap certain benefits he could give you, while in the second case you would be almost certain to have the disadvantage of the expelled partner setting up in competition with you. We may next consider the basis of our valuation of goodwill. This is generally taken upon a certain period's purchase of the average net profits of a business, *e.g.*, the goodwill of a wholesale or retail trading business is worth from one and a half to four years' purchase, of a manufacturing concern from one to three years' purchase, and of a professional concern from one to two and a half years' purchase. Certain classes of enterprise will be worth a great deal more; for instance, the goodwill of this paper. Newspapers frequently fetch ten years' purchase of profits, and the reason is not difficult to comprehend.

Here we have the goodwill consisting chiefly of the name, for if, instead of being called *THE BRITISH JOURNAL Photographic Almanac*, it was called "*The Mother's Friend*," I, for one, should have been the loser, for I should not have ever purchased a copy! Again, it matters very little to its subscribers whether the offices are in London or Manchester, and thus expenses can be kept down.

As regards a photographer's business, it is a most difficult matter to make any opinion on. So many things have to be taken into account. The business may have been built up entirely through the skill of the individual; in this case, the personality might not be able to be replaced, and so the trade would vanish. The increase or decrease of the profits must be carefully noticed, and the prospects of the future fully realised. Nothing in the nature of an extraordinary character would be taken into the account, as, for instance, the prospects of extra business due to the Coronation. A business may show a decrease of profits for the last year or two, and yet the goodwill of it may be worth a considerable sum, for the loss may be capable of ready explanation, *e.g.*, war or other national calamity, but it need hardly be stated that a decrease of profits is so very significant of non-success, in all ordinary cases, that it will require very striking evidence to justify it.

A photographer's business, in a very large number of cases, may almost be estimated on a trade basis, rather than on a professional one. I do not say this on hearsay grounds. I know it is a fact, and the reason of this is that the business could be equally, let us say, successfully worked by any photographer of normal merit and business capacity. It is quite another thing, though, with other cases. Thus if I was asked the basis on which I would estimate the goodwill of certain celebrated photographers' businesses in the West End, I should be inclined to say that it was so wrapt up in the genius and individuality of the owner, that in nine cases out of ten, it would be valueless as a commercial asset. Of course, if one felt sure of being able to turn out exactly similar work, the goodwill would be of greater value, and would be a perfect example of goodwill as a tangible asset—but the chances are against it.

An important item in professional photographic finance is what is known as repeat orders. There may be a large stock of negatives on hand whose life is still existing; constant orders may be booked for prints from them, either for personal or private use, or for publication purposes. Here it is obvious that the existence of such an item would fall directly under the definition I have given of goodwill, and though the intending purchaser might feel quite justified in treating these negatives as stock, the seller would be equally entitled to have it dealt with as part of the goodwill of the concern. The merits of the claims would have to be most carefully gone into, and an equitable apportionment arrived at.

While, as I have previously pointed out, the goodwill is usually estimated as so many months' or years' purchase of profits, it is quite possible to conceive that in many cases it is easier and more equitable to take the bulk of the business done as the basis of our computation.

This is frequently resorted to in cases where the turnover varies according to the person who is managing at the time. As pointed out by Mr. Lawrence Dicksee, F.C.A., there is an opinion rapidly gaining ground that the amount of the capital employed and the amount of time and skill which the proprietors have to expend in managing the undertaking to produce the result should be taken into the account. If this plan is adopted, the goodwill is provided for, not on the profits actually earned, but on the profits less interest on capital and less an amount estimated to cover those management expenses which have not already been charged up. This is a plan which is so obviously just and equitable to both parties that it is to be hoped that it will commend itself to the reader.

An illustration of the governing principle of this capital question will perhaps be of interest. Suppose the capital invested in an undertaking be £1,000, and that with this an income of £500 per annum is obtained, and again suppose that in another case the capital invested is £5,000, and yet only a similar £500 annual profit is realised, it stands to reason that the first business is worth a great deal more than the second one. But we have not yet made any allowance for interest on this capital. Let us make a calculation of this at five per cent. per annum. After making this deduction from the first, we have the net profit £450—i.e., £500 less 5 per cent. on £1,000; and in the second case the net profit is £250—i.e., £500 less 5 per cent. on £5,000. These two illustrations will show the importance of charging interest on the capital employed.

The other point which I raised, namely, that of the expenditure of time by the proprietor for the purposes of managing the business, is also one of great importance. Mr. Dicksee has put it very tersely in his valuable treatise on goodwill, and I cannot do better than quote him. He says:—"It is important to remember that when a man pays for goodwill, he pays for something which places him in the position of being able to earn more money than he would be able to do by his own unaided exertions. To take an extreme case, for instance, no man who places any value upon his time would pay anything for an undertaking which, after providing five per cent. interest on its capital, did not show a further profit in excess of the amount which the purchaser might be sure of earning anywhere else, without any outlay whatever." The circumstances of each individual case have to be taken into account when making the calculation for the sum to charge for this expenditure of time. In all ordinary cases a large amount is not correctly chargeable, and where only a supervision is exercised the amount may be very small. In photographers' businesses it is usual for the proprietor to devote the whole of his time to the working of his undertaking, and so the whole of the net profits pass into his pockets. Here an estimate of the value of his labours should be made by the intending purchaser, in order that he may be able to judge as to the value of the concern to himself.

It may be that the business is capable of making larger profits if it only gets into good hands. In connection with this point, it is very important to have produced to you complete accounts showing the income and expenditure in detail for, if possible, a period of three years. You will note the style and the quantity of the work done, and the number of people employed to do this work. From this you will be able to judge as to the economic management of the adventure. As I have said, be most careful to ascertain the exact position of the proprietor, his business capabilities, and the amount of time he expends on his duties. A very large amount of business is lost through an incapable or unenergetic manager, which could easily be obtained were the circumstances otherwise.

Do not, however, err on the other side, and over-estimate your own capabilities, as this is an error you may easily fall into, more especially if you have a plausible gentleman to deal with as the seller. I might point out here, in connection with the accounts, that sometimes money, which during the course of a year, amounts to quite a large sum, is frequently lost by not paying in cash, and so losing the discount. Discounts, of course, are of two kinds, viz., trade and cash. The trade discount is an allowance which is made to you by reason of you being in the wholesale business, and this amount should not appear in your accounts. Cash discount is, however, money earned by reason of your settling your liability within a certain time limit, and this should always be shown separately in your accounts, crediting your discount account,

and debiting the personal account. Thus discounts appearing in the accounts as a source of profit are quite justifiable, provided they can all be accounted for. There are certain to be sources of income or expenditure which the purchaser imagines should figure in the accounts over and above the usual items. These should be looked into, and if not present, but yet which the purchaser feels should be included, an allowance must be made for them.

Such matters as the terms of the lease are outside the province of this paper, but they nevertheless require looking into, and are, indeed, the chief point almost where the continuance of the prosperity of the business depends upon it being carried on in the same place. A charge should be made for structural repairs, and a depreciation be written off the furniture, etc. These items are charged to the income and expenditure account, or the profit and loss account, as the case may be, so as to show the net figure, at which the several assets are valued, on the balance sheet. It is important to see that this is done, as otherwise you would not be showing your real net profit in your accounts.

After these points have all been carefully attended to, we shall be in a very much better position to determine the actual value of the goodwill than we were before. Those businesses which only need a small amount of capital and involve the least amount of skilled attention, are the most valuable, and if there is anything in the connection which establishes a quasi-monopoly, as in the case of a newspaper, this will still further enhance its value.

In a photographer's business, in a large majority of cases, the ability to be able to continue the profession in the same place is of the utmost importance, for the vitality of the concern depends to a large extent on chance trade. One would therefore be careful to see that if the lease is a short term one, or nearly run out, that it would be possible to renew it. Ordinarily, the renewal of a lease is accompanied by certain onerous burdens, such as increased rent, or the expenditure of a sum of money on improvements. These are points which require careful consideration, and to which too much attention cannot be directed. It is a very difficult matter to draw a distinction between chance trade and trade arising from a connection. Photographers, of course, do a very large proportion of their business on chance trade, for casual passers-by may be attracted by some exhibition in the window, and may go in and have work done for them on account of this alone. This is undoubtedly chance trade, and the situation of the place of business and the class of people who go to make up the population of the locality, *i.e.*, whether they are permanent residents or visitors, will determine its extent. On the other hand, a good connection may have been worked up for the business, and a reputation established outside the immediate locality. This is a most desirable state of affairs, and a business so happily situated will be able to obtain for its goodwill a large sum of money. If the photographer's business is one of portraiture only, it is so largely of a personal character, and is so intimately wrapt up in its proprietor, that the complete transfer of the concern to a new purchaser might be attended by anything but happy results. In this class of case it is exceedingly advisable to endeavour to arrange for the continuance of the services of the predominant partner, at least until the new partner has comfortably established himself.

But if besides ordinary portraiture such work as trade printing is carried on, the exclusive personal character of the proprietor in all ordinary cases is not so easy to demonstrate. It would naturally be assumed that the old customers would continue their patronage, notwithstanding the change of proprietorship. It can, I think, be clearly taken for granted that

where there is profit there is also a goodwill, and inasmuch as profits fluctuate so will the value of the goodwill vary from time to time. This variation will not, however, be so violent as that of the profits, for, as I have said, it is customary to estimate the goodwill on an average of the profits over a period, and not on the actual profits of any one particular period.

Goodwill is such a very fluctuating asset that it is an exceedingly difficult matter to at any time state its value. It is clear, though, that there is a value attaching to the goodwill of a prosperous business, and so it is nearly always introduced into the accounts.

Where it is possible to do so, Mr. Dicksee thinks that the value of the goodwill should not be stated or appear in the accounts, and this is the view generally taken by accountants.

The basis on which this opinion is stated is that goodwill is a "fixed asset," and as such, according to Mr. Justice Romer, it is incorrect to take into account its fluctuations when arriving at the profits. "Floating assets," on the other hand, should always be taken into account at the true value on the date of the balancing. Fluctuations of goodwill are not taken into account for several reasons, but it is sufficient here to say that were these fluctuations taken into account the effect of a good year would be to exaggerate the business done, while if a loss was made the unfortunate position would be most ridiculously accentuated.

As a matter of bookkeeping, goodwill generally appears in the accounts, and where a sum of money is paid for it by the purchaser of a business he will almost always be sure to wish to see it in the accounts.

The capitalisation of any expenditure is a matter which should only be done after careful thought, but there are certain cases where a large expenditure may be incurred for the purpose of creating a goodwill, which can properly be treated as a capital charge. Where the purchase of a goodwill has been effected by a sole trader or a firm, it is a matter of considerable importance as to how the purchase price should be treated in the books. Without doubt, it should be entered up to the debit of the goodwill account; but it is also equally advisable to get rid of it as quickly as possible.

When you come to sell the business you will not care to show what you paid for the goodwill, and yet you wish to show it in the accounts. The profits cannot with any justice be written off against the goodwill, for the goodwill has no connection with the profits in the sense that it is of a wasting nature. The proper way to treat it is to debit your capital account and credit your goodwill account with the whole amount as soon as you possibly can.

I should, with great pleasure to myself, like to pass from this stage of our inquiry on to the purely legal side of the question, but I do not see how I can possibly do so and yet keep this article within proper limits, while maintaining its interest to ordinary readers. The amount of litigation which has taken place over the subject in its many aspects would compel me to go very much too far into details to do any credit to the matter, and would involve an amount of space being devoted to it which would be out of place in a magazine of this class. I have endeavoured to place before the reader a simple and yet thoroughly practical résumé of the principles of goodwill, and for further knowledge of the subject I can only advise him to consult Mr. Lawrence Dicksee's most admirable treatise on the subject, published by Messrs. Gee and Co., 34, Moorgate Street, E.C., which I can unhesitatingly recommend as the best work I know of dealing with the subject generally. It has, moreover, as an introduction, a valuable chapter on the law relating to goodwill from the

pen of the late Dr. Stevens. I have found this book so valuable to myself that I have adopted its arrangement for the basis of this article, and I have drawn freely upon it for the purposes of illustrating my remarks. I will conclude by giving an example which actually came before me in practice the other day. A proprietor of a small newspaper wished to dispose of his interests in the concern, and I was asked by the intending purchaser to look into the matter on his behalf. The seller wanted six years' purchase of the net annual profits, based on the average of the last three years. The accounts, such as they were, showed a certain profit to have been earned, but on more complete examination I ascertained that no interest had been charged on the capital employed, nor had any allowance been made for the time expended by the proprietor in the interests of his business. After making allowances for these essential charges and adjusting other matters, I found that instead of a profit a loss was being made, when the affair was brought down to a cold business basis and all sentiment eliminated. Notwithstanding this, I was, however, convinced that there was a certain value attaching to the goodwill of this quasi-monopoly, and suggested the offer of a small nominal sum for the full proprietary rights in the magazine. This course met with the approval of the intending purchaser. The case is interesting as indicating a very peculiar set of circumstances, but I need hardly say that it is very rarely that such a course of action could be advised. The nature of the business and its future prospects were the points on which the decision chiefly turned.

Each case of goodwill must depend so much on its own individual merits or defects that the possibility of any hard and fast rules being laid down is not practicable; but a knowledge of general principles will do much to smooth the road to a correct valuation being made.

THE LONDON COUNTY COUNCIL'S CARBIDE OF CALCIUM REGULATION.

THE following is an abstract of the Regulations as to the Keeping, Sale, and Conveyance of Carbide of Calcium in the County of London:—

This abstract has no legal validity, and is intended only for the information and guidance of the persons concerned. For further information reference should be made to the Petroleum Acts, and to the Orders in Council dated 20th February, 1897, and 7th July, 1897.

General.

1. By an order in Council, dated 26th February, 1897, carbide of calcium can only be kept in pursuance of a licence granted by the local authority.
2. By a further Order in Council, dated 7th July, 1897, not exceeding 5 lbs. of carbide may be kept without licence, provided it is kept in separate substantial hermetically-closed metal vessels containing not more than 1 lb. each.

NOTE.—The Order does not provide for the keeping of any quantity except in a closed vessel. Only one vessel should, therefore, be opened at a time, and the quantity of carbide, not exceeding 1 lb., required for use, should be at once placed in the generator, which should be immediately closed. If any carbide remain in the storage vessel, such vessel should be at once re-closed.

3. Where carbide of calcium is—

(a) Kept at any place; or

(b) Sold or exposed for sale,

the vessel containing it shall bear a label stating in conspicuous characters, the words, 'Carbide of Calcium,' 'Dangerous if not kept dry,' and with the following caution:—'The contents of this package are liable if brought into contact with moisture to give off a highly inflammable gas,' and also the name and address of the owner or vendor.

Licences.

4. Application to the Council for a licence to keep carbide of calcium at any place in the County of London (except the City of London) must be made upon the form provided for the purpose, which can be obtained by application in writing, addressed to the Chief Officer, Public Control Department of the London County Council, 6, Waterloo-place, S.W.

5. Every application must be accompanied by a fee of 5s. in money, or, if sent through the post, by cheque or postal order for that amount payable to the order of the London County Council. The fee will be returned to the applicant if the licence be not granted.

6. Every application must state—

(a) The quantity of carbide of calcium which the applicant desires to keep.

(b) The proposed place and method of storage;

(c) If the carbide is only to be kept for sale in closed vessels, or if it is to be used in the manufacture of acetylene gas.

7. Carbide of calcium should be kept in strong metal vessels, and—

(a) Such vessels should be so constructed and closed as to prevent the admission of water or atmospheric moisture.

(b) Such vessels should only be opened for the time necessary for the removal of any required quantity of carbide, or for the refilling of the vessels.

(c) No one vessel should have a greater capacity than 3696 cubic inches (equal to a cylindrical vessel, 14 inches in diameter and 24 inches in depth).

(d) Every vessel of a greater capacity than 2lbs. should be provided with a lock or be placed in a locked receptacle so as to prevent unauthorised persons gaining access to the contents.

(e) Copper should not be used in the construction of vessels for containing carbide.

8. Vessels containing carbide of calcium should not be kept inside dwelling-houses, but preferably in dry and well-ventilated outbuildings.

9. Small quantities of carbide for sale or immediate use will, however, be allowed in shops, dwelling or workshops, upon licensed premises, if the arrangements are satisfactory.

10. The Council proposes only to grant licences to keep carbide of calcium which is pure (in a commercial sense), *i.e.*, which contains no impurities liable to generate phosphoretted or siliciuretted hydrogen so as to render the gas evolved liable to ignite spontaneously.

11. Where carbide of calcium is kept for the manufacture of acetylene gas, it is desirable that such of the following precautions for ensuring safety as are applicable to the circumstances, should be adopted—

(a) Every apparatus for generating and storing acetylene gas should be placed in an outbuilding. (This does not apply to portable apparatus holding a charge of less than 2 lbs. of carbide).

(b) Such building should be separated as far as may be practicable from inhabited buildings, and should be well ventilated.

- (c) No fire or such artificial light as would ignite inflammable gas should be taken into or near the building or place where a gas-making apparatus is situate.
12. Every apparatus (including generator and gas-holder) used for acetylene gas should as far as practicable be constructed and used so as to provide against the special risk, *i.e.*—
- (a) Copper should not be used in any part of the apparatus.
 - (b) The various parts should be of adequate strength.
 - (c) Escape of gas from the apparatus should be carefully guarded against.
 - (d) Satisfactory provision should be made against dangerous development of heat.
 - (e) Satisfactory provision should be made against undue pressure by the employment of an adequate safety valve connected with a pipe discharging into the open air, and a suitable pressure gauge should be attached to the apparatus.
 - (f) Provision should be made for the residue of the carbide being mixed with at least ten times its bulk of water on being removed from the apparatus.
 - (g) No person should have charge of an apparatus until he has been properly instructed in its management.
13. Licences are granted for keeping carbide of calcium for periods not exceeding one year, and prior to expiration application must be made for their renewal. Notice of the expiration, and a form of application for renewal, is sent to each licensee at the proper time.

Conveyance of Carbide of Calcium.

14. Where carbide of calcium is sent or conveyed, the vessel containing it shall bear a label stating in conspicuous characters the words, "Carbide of Calcium," "Dangerous if not kept dry," and with the following caution:—"The contents of this package are liable if brought into contact with moisture to give off a highly inflammable gas," and also the name and address of the sender.

15. Carbide of calcium conveyed to or from licensed premises must be conveyed in accordance with the conditions of the licence.

Inspection.

16. Any dealer who refuses to show to any officer authorised by the Council every or any place or all or any of the vessels in which carbide of calcium in his possession is kept, or to give him such assistance as he may require for examining the same, or to give to such officer samples of such carbide of calcium on payment of the value of such samples, or who willfully obstructs the Council, or any officer of the Council, in the execution of these Acts and the order made thereunder, is liable to a penalty not exceeding twenty pounds.

ALFRED SPENCER, *Chief Officer.*

6, Waterloo-place, S.W., April 21, 1899.

THE LONDON COUNTY COUNCIL'S NEW REGULATIONS
RESPECTING THE USE OF CINEMATOGRAPH LANTERNS,
&c., IN PREMISES LICENSED BY THE COUNCIL.

(Approved by the Council, October 16, 1900.)

1. No cinematograph, or other similar apparatus involving the use of a lengthy combustible film, shall be exhibited on premises licensed by the Council, until the Council has been satisfied that all reasonable precautions have been taken against accident and danger to the public.

2. Notice of any intended exhibition shall be given to the Clerk of the Council by the licensee of the premises in which such exhibition is to be given, and the licensee shall be held entirely responsible for the proper and safe use of the apparatus. Such notice shall be given at least three days before the first day of exhibition. Opportunity shall also be afforded to the Council's inspector of inspecting the apparatus before the public exhibition takes place, in order to allow time for any necessary alterations to be carried out and approved by the Council. No gangway or exit must be in any way affected.

3. The cinematograph shall stand in a suitable fire-proof room or closed sheet-iron box of sufficient dimensions to allow the operators to work freely and fitting closely to the floor, which shall be covered with fire-resisting material within such room or box. The door or doors shall open outwards and be self-closing, and of the three windows which are necessary in the front face of the enclosure, the centre one shall not exceed 8 inches square, and the windows on each side shall not exceed 6 inches square; a flap screen, to cover all these three holes, shall be fitted and actuated both from the inside and from the outside of the enclosure; the space separating the audience and seats from the iron enclosure shall not be less than 2 feet in width at the sides and in the front of the enclosure, and the space at the back in which the door is situated shall not be less than 6 feet from the enclosure. The audience shall be completely excluded from the above space around the enclosure by a suitable barrier. No unnecessary combustible material shall be within the enclosure, and, as far as possible, all necessary combustible material shall be rendered fire-proof, or shall be enclosed in fire-proof receptacles. The part of the film immediately opposite the lens shall be provided with an apparatus which prevents the film, if kindled, from burning towards either of the spools.

4. The body of the lantern shall be constructed of wood or other non-conducting material, and shall be coated inside with asbestos; it shall also have an inner lining of sheet-iron, and an air space shall be left between the iron and asbestos lining. In the bottom of the lantern shall stand an iron tray, which shall be surrounded by a vertical edge at least 1 inch in depth. The lantern shall be provided with a metal shutter, which shall fall freely between the source of light and the condenser. This shutter shall be immediately dropped in the event of any accident to the apparatus or stoppage of the film, and shall only be raised when the film is in motion for the purpose of projection.

5. Where possible the electric arc light shall be adopted as an illuminant, the usual rules for securing safety in an electric installation being observed. Ether and other inflammable liquids shall not be employed under any circumstances for producing light. If limelight be used in the lantern the general regulations for its safety, which are issued by the Council, shall be complied with, and any additional precautions which the Council may deem necessary for securing safety shall also be adopted. The use of acetylene gas will not be permitted.

6. The space in which the cinematograph stands shall, where possible, be illuminated by electric glow lamps; but a miner's safety lamp may be substituted, if necessary. No naked gas or oil flames, or matches shall be allowed in the space. The lighting of the hydrogen flame in the lantern shall be accomplished by means of an electric lighter.

7. The films, when not actually passing through the lantern, shall be kept enclosed in metal cases. The film which is passing through the lantern shall be re-wound, either automatically or by hand, upon another bobbin as fast as it emerges from the lantern front.

8. Not less than two, nor more than three, operators shall be engaged within the lantern space, and no other persons shall be within the lantern enclosure during the exhibition. The whole duty of one of the operators shall consist in taking charge of the film after it has passed through the lantern.

9. The licensee shall be held responsible for the employment of competent, experienced and trustworthy operators, and shall be prepared at any time to supply to the Council satisfactory credentials in this respect.

10. Smoking within the lantern space shall be absolutely forbidden at all times.

11. The Council reserves to itself the right of modifying any of the above regulations and of requiring the adoption of any further precautions, in addition to those specified above, as circumstances may require.

THE POISONS ACT.

The following is a list of poisons scheduled in the Poisons Act.

SCHEDULE A.

Part 1.—Arsenic and its preparations, prussic acid, cyanide of potassium and all metallic cyanides, strychnine and all poisonous vegetable alkaloids and their salts, aconite and its preparations, emetic tartar, corrosive sublimate, cantharides, savin and its oil, ergot of rye and its preparations.

Part 2. Oxalic acid, chloroform, belladonna and its preparations, essential oil of almonds unless deprived of its prussic acid, opium and all preparations of opium or of poppies.

The clauses of the Act which relate to the sale of poisons by unqualified persons are two in number, and are as follows:—

From and after December 31, 1868, any person who shall sell or keep an open shop for the retailing, dispensing, or compounding poisons, or who shall take, use, or exhibit the name or title of chemist and druggist, or chemist or druggist, not being a duly registered pharmaceutical chemist, or chemist and druggist, or who shall take, use, or exhibit the name or title pharmaceutical chemist, pharmacist, or pharmacist, not being a pharmaceutical chemist, or shall fail to conform with any regulation as to the keeping or selling of poisons made in pursuance of this Act, or who shall compound any medicines of the British Pharmacopœa, except according to the formularies of the said pharmacopœa, shall for every such offence be liable to pay a penalty or sum of 5*l.*, and the same may be sued for, recovered, and dealt with in the manner provided by the Pharmacy Act for the recovery of penalties under the Act; but nothing in this Act contained shall prevent any person from being liable to any other penalty, damages, or punishment to which he would have been subject if this Act had not passed.

It shall be unlawful to sell any poison, either by wholesale or by retail, unless the box, bottle, vessel, wrapper, or cover in which such poison is contained be distinctly labelled with the name of the article and the word poison, and with the name and address of the seller of the poison; and it shall be unlawful to sell any poison of those which are in the first part of Schedule A to this Act, or may hereafter be added thereto under section two of this Act, to any person unknown to the seller, unless introduced by some person known to the seller; and on every sale of any such article the seller shall, before delivery, make or cause to be made, an entry in a book to be kept for that purpose stating, in the form set forth in Schedule F to this Act, the date of the sale, the name and address of the purchaser, the name and quantity of the article sold, and the purpose for which it is stated by the purchaser to be required, to which entry the signature of the purchaser and of the person, if any, who introduced him shall be affixed; and any person selling poison otherwise than is herein provided shall, upon a summary conviction before two justices of the peace

A TABLE OF POISONS AND ANTIDOTES. Compiled by Mr. J. V. ELSDEN

Poisons.	Remarks.	Characteristic Symptoms.	Antidote.
Vegetable Caustic Acid. Alkalies.	OXALIC ACID, including POTASSIUM OXALATE	Hot burning sensation in throat and stomach; vomiting, cramps, and numbness.	Chalk, whiting, or magnesia suspended in water. Plaster or mortar can be used in emergency. Vinegar and water.
	AMMONIA POTASH SODA	Swelling of tongue, mouth, and fauces; often followed by stricture of the œsophagus.	
	MERCURIC CHLORIDE	Acrid, metallic taste, constriction and burning in throat and stomach, followed by nausea and vomiting.	White and yolk of raw eggs with milk. In emergency, flour paste may be used.
Metallic Sa'ts.	ACETATE OF LEAD	Constriction in the throat and at pit of stomach; crampy pains and stiffness of abdomen; blue line round the gums.	Sulphates of soda or magnesia. Emetic of sulphate of zinc.
	CYANIDE OF POTASSIUM	Insensibility, slow gasping respiration, dilated pupils, and spasmodic closure of the jaws.	No certain remedy; cold affusion over the head and neck most efficacious.
	BICHROMATE OF POTASSIUM	Smarting sensation.	Sulphate of iron should be applied immediately.
Concentrated Mineral Acids.	NITRATE OF SILVER	Irritant pain in stomach and vomiting.	Emetics and magnesia, or chalk.
	NITRIC ACID	Produces troublesome sores and ulcers. Powerful irritant.	Common salt to be given immediately, followed by emetics.
	HYDROCHLORIC ACID SULPHURIC ACID	Corrosion of windpipe, and violent inflammation.	Bicarbonate of soda, or carbonate of magnesia or chalk, plaster of the apartment beaten up in water.
	IODINE	concentrated, has as powerful an effect as the mineral acids.	Vomiting should be encouraged, and gruel, arrowroot, and starch given freely.
	ETHER	Acrid taste, tightness about the throat, vomiting.	Cold affusion and artificial respiration.
	PYROGALLIC	Effects similar to chloroform.	No certain remedy. Speedy emetic desirable.
		Resembles phosphorous poisoning	

in England, or the sheriff in Scotland, be liable to a penalty not exceeding 5*l.* for the first offence, and to a penalty not exceeding 10*l.* for the second or any subsequent offence, and for the purpose of this section the person on whose behalf any sale is made by any apprentice or servant shall be deemed to be the seller; but the provisions of this section, which are solely applicable to poisons in the first part of the Schedule A to this Act, or which require that the label shall contain the name and address of the seller, shall not apply to articles to be exported from Great Britain by wholesale dealers, nor to sales by wholesale to retail dealers in the ordinary course of wholesale dealing, nor shall any of the provisions of this section apply to any medicine supplied by a legally qualified apothecary to his patient, nor apply to any article when forming part of the ingredients of any medicine dispensed by a person registered under this Act; provided such medicine be labelled, in the manner aforesaid, with the name and address of the seller, and the ingredients thereof be entered, with the name of the person to whom it is sold or delivered, in a book to be kept by the seller for that purpose; and nothing in this Act contained shall repeal or affect any of the provisions of an Act of the Session holden in the fourteenth and fifteenth years in the reign of Her present Majesty, intituled *An Act to Regulate the Sale of Arsenic*.

TONING AND FIXING BATH.

APPLICATION OF THE TABLE.

In the following example the third column shows the simple conversion by the table into proportional parts. The fourth gives the same, adjusted to 1,000 parts of water.

1. Materials.				2. As commonly given.	3. Proporti nate parts converted by table.	4. Last multiplied by $\frac{20}{4}=5$
A	Sodium tungstate ...	...	...	180 grs.	20 6 say 20	—
	Ammonium sulphocyanide.			300 grs.	34	—
	Hypo ...	...	...	6 ozs.	300	—
	Water ...	...	..	20 ozs.	1000	—
B	Gold chloride ...	...	...	15 grs.	1·71	8·5 say 9
	Water ...	...	...	4 ozs.	200	1000

When in use, the quantity of gold constantly varies. Therefore 10 per 1000=1 per cent. may be used. A tube contains 1 gramme of gold chloride, and only requires to be dissolved in 100 c.c. of water.

For developing, use 100 c.c. conical graduated glass. A 500 c.c. measure is a convenience in making up solutions, but is by no means essential. Foreign medicinal water bottles contain 1 litre (1000 grammes or cubic centimetres) and are useful for solutions.

INSURANCE COMPANIES AND EXHIBITIONS OF ANIMATED PHOTOGRAPHY

In view of the increasing number of Exhibitions of animated pictures which are being held, it may be desirable that our readers should know under what conditions Fire Offices allow the use (either temporary or permanent) of cinematographs or similar apparatus. The following have been adopted by Insurance Companies:—

RULES *re* EXHIBITION OF ANIMATED PICTURES.

1. The lantern must be constructed of metal or lined with metal and asbestos.

2. An alum or water bath must be used between the condenser and the film.

3. The apparatus must be fitted with a drop shutter available in case of emergency.

4. If the film does not wind upon a reel or spool immediately after passing through the machine, a metal receptacle with a slot in the metal lid must be provided for receiving it.

5. If electric arc lights are used, the installation must be in accordance with the usual rules, *i.e.*, the choking coils and switch to be securely fixed on incombustible basis, preferably on a brick wall, and d.p. safety fuses to be fitted.

6. If oxyhydrogen gas is used, storage must be in metal cylinders only.

7. The use of an ether saturator is not to be permitted under any circumstances.

Position.—Preferably on an open floor with a space of at least six feet all round railed off. If in a compartment, the compartment to be lined with fire-resisting materials. In any case no drapery or combustible hangings to be within two yards.

General.—Fire buckets to be kept filled, and a damp blanket to be provided and placed close at hand.

FREEZING MIXTURES.

THE following mixtures will be found useful where ice is not readily obtainable—

Ingredients.		Parts by Weight.	The Temperature at starting being 50° Fahr. the thermometer sinks.	Diminution of Temperature.
1	{ Water.....	1	From +50° to + 4°	46° Fahr.
	{ Nitrate of ammonia.....	1		
2	{ Water.....	16	,, +50° „ +10°	40° „
	{ Saltpetre	5		
	{ Chloride of ammonium(sal ammoniac).....	5	,, +50° „ + 7°	43° „
3	{ Water.....	1		
	{ Nitrate of ammonia.....	1		
	{ Carbonate of soda.....	1	,, 32° „ - 5°	37° „
4	{ Snow	2		
	{ Chloride of sodium	1	,, +32° „ - 50°	82° „
5	{ Snow	2		
	{ Crystallised chloride of calcium.....	3	,, + 0° „ 0°	50° „
6	{ Crystallised sulphate of soda	8		
	{ Hydrochloric acid.....	5		

COINS AS WEIGHTS AND MEASURES.

1 Sovereign weighs	123.274 grains
1 Shilling "	87.273 "
48 Pence "	1 lb. avoirdupois
Half-penny and three-penny piece weigh	$\frac{1}{4}$ ounce
Florin and sixpence	$\frac{1}{2}$ "
Three pennies	1 "
4 half-crowns and 1 shilling	2 ounces
4 florins, 4 half-crowns, 2 pennies, weigh	4 "
1 half-penny = 1 inch in diameter	

ENGLISH AND METRICAL SIZES OF PLATES.

ENGLISH SIZES CONVERTED INTO METRIC MEASURE.

Inches.		Centimetres.
$3\frac{1}{4}$ × $3\frac{1}{4}$	(Lantern size)	8.2 × 8.2
$4\frac{1}{4}$ × $3\frac{1}{4}$	(Quarter-plate)	10.8 × 8.2
5 × 5	(American size)	12.7 × 10.1
$6\frac{3}{4}$ × $3\frac{1}{4}$	(Stereoscopic)	17.2 × 8.2
$6\frac{1}{2}$ × $4\frac{1}{4}$	(Double quarter)	16.5 × 10.8
$6\frac{1}{2}$ × $4\frac{3}{4}$	(Half-plate)	16.5 × 12.0
7 × 5	.....	17.7 × 12.7
$7\frac{1}{2}$ × 5	.....	19.0 × 12.7
8 × 5	.....	20.3 × 12.7
$8\frac{1}{2}$ × $6\frac{1}{2}$	(whole-plate)	21.5 × 16.5
9 × 7	.....	23.0 × 17.7
10 × 8	.....	25.4 × 20.3
12 × 10	.....	30.5 × 25.4
15 × 12	.....	38.0 × 30.5
18 × 16	.....	46.0 × 40.6
20 × 16	.....	50.8 × 40.6
22 × 18	.....	55.9 × 46.0
24 × 20	.....	61.0 × 50.8

METRICAL SIZES CONVERTED INTO ENGLISH MEASURES.

Centimetres.		Inches.
9 × 12	.....	$3\frac{9}{16}$ × $4\frac{3}{4}$
12 × 15	.....	$4\frac{11}{16}$ × $5\frac{7}{8}$
13 × 18	.....	$5\frac{1}{8}$ × $7\frac{1}{8}$
18 × 24	.....	$7\frac{1}{8}$ × $9\frac{3}{8}$
21 × 27	.....	$8\frac{5}{16}$ × $10\frac{11}{16}$
24 × 30	.....	$9\frac{9}{16}$ × $11\frac{7}{8}$
30 × 40	.....	$11\frac{7}{8}$ × $15\frac{3}{4}$
40 × 50	.....	$15\frac{1}{16}$ × $19\frac{11}{16}$

EXHIBITION RULES.

THE following rules for the conduct of Photographic Exhibitions have been agreed to by a conference of Judges:—

RULES,

1. The Judges' decision upon the merit of the exhibits shall be final, and they shall not be asked to decide any other point.
2. The Judges shall have full power to withhold any award, and this shall be stated in the prospectus.

3. The Judges shall have power to exclude all persons from the room while judging.

4. The Judges' expenses shall be paid.

5. The Judges shall not adjudicate upon pictures exhibited as produced with wares of special trading firms.

6. No awards shall take the form of a money prize.

7. Where there is a champion class, pictures which have previously taken awards in OPEN classes shall be exhibited in the champion class only.

8. An award shall be made to one picture only, whether it is in print, lantern slide or other form; but in cases where the exhibition rules provide for slides to be exhibited in sets, the award shall be made to the best slide in the best set.

9. There shall be no distinction between amateur and professional.

10. No production of any kind whatever from the same negative shall receive more than one award, at the same exhibition. This includes lantern slides, enlargements, &c.

11. No award shall be made to a lantern slide until it has been projected on the screen.

12. It shall be stated on the entry form to what extent the work sent for competition is that of the exhibitor.

13. That the names of those who have consented to act as Judges shall be printed in the prospectus of the Exhibition.

RECOMMENDATIONS.

14. Where the Judges make more than one award to the same competitor all these should be published in the award list, although there be an exhibition regulation debarring a competitor from receiving more than one prize.

15. The Judges should have power to give extra awards where they may think fit.

16. In order to enhance the value of awards their number should be limited.

17. The Exhibition Committee should not accept offers of awards from trading firms.

18. It is desirable not to have classes. Where there are classes, their number should be kept as small as possible, and divisions where made should be entirely respecting "subjects," such as portraiture, landscape, &c., and not such as hand-camera classes, enlargement classes, &c.

The undermentioned Judges have signified their intention of upholding the rules of all future open exhibitions:—

R. CHILD BAYLEY,
THOMAS BEDDING,
J. BULBECK,
HAROLD BAKER,
F. P. CEMBRANO,
LYONEL CLARK,
WALTER L. COLLS,
P. H. EMERSON,
J. GALE,
JOHN H. GEAR,
J. P. GIBSON,
JOHN A. HODGES,
FREDERICK HOLLYER,
PAYNE JENNINGS,
FRED. C. LAMBERT,

PAUL LANGE,
EDGAR G. LEE,
PERCY LUND,
A. MACKIE,
C. H. OAKDEN,
ANDREW PRINGLE,
JAMES A. SINCLAIR,
HENRY STURMEY,
W. THOMAS,
W. WAINWRIGHT,
E. J. WALL,
H. STOWDEN WARD,
MRS. CATHARINE WEED WARD,
J. B. B. WELLINGTON.

ON THE RELATIVE POWER OF LANTERN ILLUMINANTS.

M. MOLteni gives these as follows. His experiments were made with an ordinary lantern, in the stage of which was inserted a screen with an opening seven cm. square, similar to the marks used in mounting lantern transparencies. The distance of the lantern from the screen was so adjusted that the side of the enlarged image of the square measured one metre. The enlarged image was received on the Bunsen grease spot (commonly used in photometry), the surface of which, remote from the lantern, was illuminated by a lamp carefully standardised by means of a "Carcel" standard, burning forty-two grammes of oil per hour. The "Carcel" lamp is the standard of light in general use in France. It is equal to ten English standard sperm candles. The distance of the standard lamp from the screen was adjusted so as to obtain equality of illumination on each side, and the relative intensity of the various lights was calculated from the distances thus obtained. It will, of course, be understood that during the various trials the lantern was not moved from the position necessary to give an enlargement of one metre square. The following are the results obtained:—

Multiple wick oil lamps	1
Welsbach burner (No. 2) without reflector	1

ACETYLENE—

1 burner, without reflector	1.06
2 burners, without reflectors	1.70
3 " " " "	3.20
4 " " " "	4.10
5 " " " "	4.50

LIMELIGHT—

Oxycalcium (alcohol and oxygen)	5.80
Oxyhydrogen (coal gas and oxygen)	16.60
Oxyether (gasoline and oxygen)	18.50

ELECTRIC (CONTINUOUS CURRENT)—

Ordinary incandescent lamp 32 c.p. (?)	68
" " (vertical) 50 c.p. (?)	93
" " (horizontal) 50 c.p. (?)	93
Focus lamp, 100 c.p.	3.82
Arc Lamp, 7 ampères	39.03
" 10 "	75.61
" 12 "	86.50
" 15 "	117.61
" 20 "	160.80

The above results might, of course, have been expressed in terms of the Carcel unit, but the author is of the opinion that the table is likely to be more useful in the form in which an ordinary multiple wick oil lamp is taken as an approximate unit, since every one who has had the mere experience in lantern matters will be able to attach a tangible value to the figures when thus expressed; as, for instance, that the oxyhydrogen light is from sixteen to eighteen times more powerful than the paraffin lamp or an arc light of seven ampères about twice the power of the oxyhydrogen light.

TABLE FOR FINDING THE MINIMUM LENGTH OF STUDIO FOR A GIVEN LENS.

(From the "American Amateur Photographer.")

DISTANCES IN INCHES FROM OBJECT TO LENS.

Equivalent Focus of Lens. In.	3 in. high.	4 in. high.	5 in. high.	6 in. high.	8 in. high.	10 in. high.	12 in. high.	16 in. high.	20 in. high.	24 in. high.	30 in. high.	36 in. high.	48 in. high.	54 in. high.	60 in. high.	72 in. high.
3	75	57														
4	100	76	61 ³ / ₈	52												
5	125	95	77	65	50											
6	150	114	92 ³ / ₈	78	60	49 ¹ / ₈										
8	200	152	123 ¹ / ₂	104	80	65 ⁵ / ₈	56									
10	240	190	154	130	100	82	70	55								
12	300	228	184 ¹ / ₂	156	120	98 ³ / ₈	84	66	55 ¹ / ₂							
16	400	304	246	208	161	131	112	88	72 ¹ / ₂	64	54 ¹ / ₈	48				
20	500	380	308	260	200	164	140	110	90 ¹ / ₂	80	68	60	50	46 ³ / ₈		
24	600	456	369 ³ / ₈	312	240	196 ¹ / ₈	168	132	110 ¹ / ₂	96	81 ¹ / ₈	72	60	56	52 ¹ / ₈	48
30	750	540	462	390	300	246	210	165	136 ¹ / ₂	120	102	90	75	70	65	60
36	900	684	554 ¹ / ₂	463	360	307 ¹ / ₂	252	198	165 ¹ / ₂	144	122 ¹ / ₂	108	90	84	79 ¹ / ₂	72
48	1200	912	739 ¹ / ₂	624	480	393	336	264	220 ¹ / ₂	192	163 ¹ / ₂	144	120	112	105 ¹ / ₂	96
60	1500	1080	1024	780	600	492	420	330	272 ¹ / ₂	240	204	180	150	140	132	120
72	1800	1368	1108 ¹ / ₂	936	720	614 ¹ / ₂	504	396	321 ¹ / ₂	288	244 ¹ / ₂	216	180	168	158 ¹ / ₂	144

DISTANCES IN INCHES FROM LENS TO GROUND GLASS.

Equivalent Focus of Lens. In.	3 in. high.	4 in. high.	5 in. high.	6 in. high.	8 in. high.	10 in. high.	12 in. high.	16 in. high.	20 in. high.	24 in. high.	30 in. high.	36 in. high.	48 in. high.	54 in. high.	60 in. high.	72 in. high.
3	31 ¹ / ₈	31 ¹ / ₈														
4	4 ¹ / ₈	4 ¹ / ₈														
5	5 ¹ / ₈	5 ¹ / ₈														
6	6 ¹ / ₈	6 ¹ / ₈														
8	8 ¹ / ₈	8 ¹ / ₈														
10	10 ¹ / ₈	10 ¹ / ₈														
12	12 ¹ / ₈	12 ¹ / ₈														
16	16 ¹ / ₈	16 ¹ / ₈														
20	20 ¹ / ₈	20 ¹ / ₈														
24	24 ¹ / ₈	24 ¹ / ₈														
30	30 ¹ / ₈	30 ¹ / ₈														
36	36 ¹ / ₈	36 ¹ / ₈														
48	48 ¹ / ₈	48 ¹ / ₈														
60	60 ¹ / ₈	60 ¹ / ₈														
72	72 ¹ / ₈	72 ¹ / ₈														

Suppose the lens used is 24 in. equivalent focus, and you wish to make a full-length portrait of a man 6 ft. high, in which the image will be 6 in. high. Look at the left-hand column for lens focus, and in the top line for size of image. At the intersection of these columns we find 312 in. = 26 ft., to be the distance the person must stand from the lens. In the next table, using the same lens and size of image as before, at the intersection of the columns we find 26 in., which represents the distance of the ground glass from lens centre. And in the same way any lens and size of image may be computed for.

CHARACTERISTIC REACTIONS OF THE KNOWN DEVELOPING AGENTS.

[Translated from the *Photographische Correspondenz*.]

By DR. M. ANDRESEN.

THE number of the developing substances used in photography has so considerably increased in the last decade that a summary of the characteristic reactions of these substances will be useful to the practical worker. The tabular statement will render it easy for any expert to recognise any developer which may be introduced into the market under a fancy name.

It is advisable to make the investigation in a systematic manner. The substances must be tested in a given order of reactions, so that it will be easier and more certain to determine what developing substances may be present, and then to determine by special tests what is the actual substance.

The procedure is somewhat different, according to whether the substance is in the solid or liquid form.

A. THE SUBSTANCE IS A SOLID.

A small quantity, about 1 gramme, should be finely powdered and dissolved in 100 c.c. of cold water.

(a) The substance will not dissolve. Test for glycine and di-amido-oxyphenol.

1. It dissolves on the addition of some solid sodium sulphite and carbonate of potash=glycine. Test the solubility of the original substance in water on the addition of hydrochloric acid (soluble) and of acetic acid (insoluble), and whether the solution, acidulated with dilute sulphuric acid, gives off the smell of quinone on oxidation with potassium bichromate (1: 15).

2. The substance does not dissolve on addition of sodium sulphite and potash=di-amido-oxyphenol. The original substance should be soluble in water in the presence of acetic acid, so that no quinone is formed on oxidation.

(b) A clear solution is formed. In this case all the other developing agents must be tested for.

Add to the one per cent. aqueous solution five per cent. of dry sodium sulphite and ten per cent. of potassium carbonate.

1. If a fine crystalline powder separates out=para-amidophenol. This should be confirmed by the special reactions.

2. The solution remains clear, but becomes coloured; it may be amidol, eikonogen, tri-amidophenol, pyrogallol, or di-amido-resorcin.

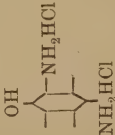
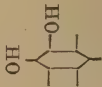
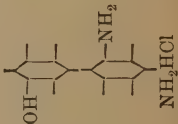
(a) If the colour is blue=amidol. Test further.

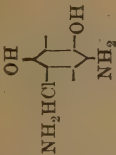
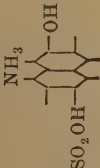


(b) The colour is golden yellow, and does not alter on standing exposed to the air=eikonogen. Test further.

(c) Colour greenish, especially when shaken in a half-filled bottle, and turns brown on adding a few drops of caustic soda=tri-amido-phenol. Test further with ferric chloride.





(d) The solution is brown, which increases on shaking in the air=pyrogallol or di-amido-resorcin. Add a few drops of caustic soda.

REACTIONS OF DEVELOPING SUBSTANCES.

COMMERCIAL NAME.	SCIENTIFIC NAME.	CONSTITUTION FORMULA.	CRYSTALLINE FORM.	MELTING POINT OF THE COMPOUND.	SOLUBILITY.	BEHAVIOUR TO ACIDS.
AMIDOL.	Hydrochlorate of 2·4 di-amidophenol.		Colourless needles.	Decomposes on heating without melting.	Easily soluble in water. Sol. in alcohol and ether with difficulty.	Precipitated from aqueous solution by conc. hydrochloric acid.
BRENZCAT-CHINE or PYROCAT-CHINE.	1·2 Dioxybenzol.		Broad flakes (from benzol). Prismatic needles (from water).	104°	Readily soluble in water, alcohol, and ether; 4 soluble in cold benzol.	—
DI-AMIDO-OXYDI-PHENAL or DIPHENAL.	Di-amido-oxyphenol.		From water in long feilded needles.	148°	Readily soluble in alcohol, glacial acetic acid, and hot water; with difficulty in benzol; almost insoluble in cold water.	Soluble in dilute acids; for instance, acetic.

DI-AMIDO-RESORCIN.	Hydrochlorate of 4:6 Di-amido-resorcin.		Rhombic tables.	Decomposed by heat without melting.	Very soluble in water; sol. with difficulty in alcohol and ether.	Very readily ppt. by conc. HCl from aqueous sol.
EIKONOG.	Sodium salt of α_1 amido- β_1 -naphthol- β_3 -sulphonic acid.		Rhombic plates.	Loses at 110° 2½ molecules of water of crystallisation. On further heating, decomposes without melting.	Easily soluble in hot water; less soluble in cold; almost insoluble in alcohol and ether.	Acids precipitate the free acid in fine white needles from aqueous solution of eikonogen.
GLYCIN.	p-oxyphenyl-glycin.		Mica-like plates.	Melts with decomposition.	V. s. sol. in water and alcohol, insol. in ether.	Forms with mineral acids salts sol. in water, but not with acetic acid.
HYDROQUINONE.	1:4 dioxyl-benzol.		Needles, or long hexagonal plates.	169°	Easily sol. in alcohol, ether, and hot water; less sol. in cold, sol. in cold benzol.	—

REACTIONS OF DEVELOPING SUBSTANCES—Continued.

COMMERCIAL NAME.	SCIENTIFIC NAME.	CONSTITUTION FORMULA.	CRYSTALLINE FORM.	MELTING POINT OF THE COMPOUND.	SOLUBILITY.	BEHAVIOUR TO ACIDS.
METOL.	Sulphate of the methyl-o-amidophenol.	$\text{N} < \begin{array}{c} \text{H} \\ \text{CH}_3 \end{array} \frac{\text{H}_2\text{SO}_4}{2}$ 	Needles or prisms. The free base crystallises in long needles.	Decomposes without melting. The free base melts at 87° C.	V. sol. in water, s. sol. alcohol and ether. The free base v. sol. in alc., ether, and hot water, less sol. in cold.	—
ORTOL.	Sulphate of methyl-o-amidophenol + hydroquinone (a mixture).	 $+$  $\frac{\text{H}_2\text{SO}_4}{2}$	Sulphate of methyl-o-amidophenol crystallises in flat rhombic tables or prisms.	Sulphate of methyl-o-amidophenol decomposes on heating without melting. The free base melts at 80° with decomposition.	V. sol. in water, partial sol. in alcohol and ether (hydroquinone dissolves).	—
PARA-AMIDOPHENOL.	Hydrochlorate of 1-4-amidophenol.	 NH_2HCl	Prisms. The free base crystallises in plates.	Decomposed on heating without melting. The free base melts with decomposition at 184°.	V. sol. in water, s. sol. in alcohol and ether. The free base is v. sol. in hot, s. sol. in cold water, fairly sol. in alcohol, s. sol. in ether.	Precipitated from aqueous sol. by conc. hydrochloric acid.

PARA-PHENYL- ENDIAMINE.	Hydrochloro- rate of 1.4 phenyl-dia- mine.	$\text{NH}_2\text{HCl} \begin{array}{c} \diagup \quad \diagdown \\ | \quad | \\ \diagdown \quad \diagup \end{array} \text{NH}_2\text{HCl}$	Triclinic tablets The free base crystallises from ether in tablets. From water mono- clinic crystals are obtained which are con- verted in the water into rhombic plates.	Decomposed without melting. The free base melts at 140°.	V. sol. in water. S. sol. in alcohol. M. sol. in ether. The free base is v. sol. in alcohol and ether, less sol. in water.	Ppt. by conc. hydrochloric acid from the aqueous solution.
PYROGALLOL.	1.2.3-Tri-oxy- benzol.	$\begin{array}{c} \text{OH} \\ | \\ \text{OH} - \text{C}_6\text{H}_2 - \text{OH} \end{array}$	Colourless shining needles.	Melts at 132.5°.	V. sol. in water, alcohol, and ether.	—
TRI-AMIDO- PHENOL.	Hydrochlorate of 2.4.6 tri- amidophenol.	$\begin{array}{c} \text{OH} \\ | \\ \text{NH}_2\text{HCl} - \text{C}_6\text{H}_2 - \text{NH}_2\text{HCl} \\ | \\ \text{NH}_2\text{HCl} \end{array}$	Needles.	Decomposed without melting.	V. sol. in water, almost insol. in alcohol and ether.	Conc. hydro- chloric acid ppt. the com- pound from aqueous solution.

REACTIONS OF DEVELOPING SUBSTANCES - *Continue*l.

COMMERCIAL NAME.	BEHAVIOUR TO ALKALIES.	BEHAVIOUR TO OXIDISING SUBSTANCES.	USED AS A DEVELOPER IN CONJUNCTION WITH—	REMARKS.
AMIDOL.	Sulphite solutions on addition of potassium carbonate turn blue, with caustic potash a Bordeaux red colour.	Ferric chloride produces an intense red colour in aqueous solution. Amidol does not give quinone on oxidation.	Neutral sodium sulphite; alkalis.	—
BRENZCATE-CHINE or PYROCATE-CHINE.	Cannot be separated from an aqueous sol. by shaking with ether in the presence of caustic alkalis. After acidulation of the sol. is taken up by the ether.	An aqueous solution gives an emerald green colour with a drop of ferric chloride; without the addition of carb. soda, turns violet red. Gives no quinone.	Alkaline carbonates.	Solution of lead acetate causes a white ppt. with aqueous solution of pyrocatechine.
DI-AMIDO- OXYDI-PHENAL or DIPHENAL.	Not soluble with sulphite or alkaline carbonates, requires caustic alkalis.	Gives no quinone on oxidation.	Caustic alkalis.	The diazo compound of di-amido-oxyphenol gives, with Andresen's <i>α</i> -naphthol-disulphonic acid a ponceau red dye (compare para-amidophenol).

DI-AMIDO- RESORCIN.	Aqueous sulphite sol. give with pot. carb. a yellow brown; with caustic alkalis, a blue colour.	One drop of ferric chloride sol. gives, in dilute di-amido-resorein sol., an intense violet colour, which after a short time disappears. No quinone formed.	Neutral, alkaline, sulphites.	—
EIKONOGEN.	Alkaline solutions have a golden yellow colour.	No quinone on oxidation.	Neutral sulphites with alkaline carbonates.	—
GLYCIN.	I ₂ converted by sodium sulphite, carbonate, and caustic alkalis into salts, which are readily soluble in water.	Gives chinone when oxidised with pot. bichrom. and sulphuric acid, with evolution of CO ₂ .	Caustic alkalis and carbonates.	—
HYDROQUINONE.	Not separated from alkaline aqueous sol. by agitation with ether; is removed, however, after acidifying.	Is easily converted by oxidising agents into quinone. A convenient oxidising sol. is made by dissolving 1 part of conc. sulphuric acid and 1 part of pot. bichrom. in 20 parts of water.	Caustic alkalis and carbonates.	Quinone is recognised by its pungent smell, which is readily given off on heating to boiling aqueous solutions.

COMMERCIAL NAME.	BEHAVIOUR TO ALKALIES.	BEHAVIOUR TO OXIDISING SUBSTANCES.	USED AS A DEVELOPER IN CONJUNCTION WITH—	REMARKS.
METOL.	Aqueous solutions of metol, which also contain a large proportion of neutral sulphites or alkaline carbonates, contain the metol in the form of the free base.	Gives quinone on oxidation. Metol is, therefore, a phenol derivative, and not a cresol derivative, as is frequently assumed.	Alkaline carbonates.	If an aqueous sol. of metol be acidulated with dilute sulphuric acid, and some nitrite sol. added, the nitroso compound of metol ($C_6H_4(OH)CH_3N$) separates out in fine felted needles. Etheral sol. of the metol base on evaporation leaves the metol in the form of an oily liquid, which set, on standing, into long rosette-shaped crystals.
ORTOL.	—	Gives, on oxidation with bichromate and sulphuric acid, a deep Bordeaux red colour, and also quinone.	Alkaline carbonates.	—
PARA-AMIDOPHENOL.	Alkaline sulphites and carbonates ppt. the free base from concentrated aqueous solution; caustic alkalies also ppt. the free base, which is again dissolved on further addition with the formation of phenolate.	Oxidation easily produces quinone. On the addition of chloride of lime sol. to a sol. para-amidophenol mixed with hydrochloric acid, a deep violet colour is first formed, and, on further addition, yellow flocks of chloranilic quinone separate.	Caustic carbonates and alkalies.	If a solution of hydrochlorate of para-amidophenol be acidulated with hydrochloric or sulphuric acid, and some nitrite solution added till the smell of nitrous acid is recognised, a diazo compound is formed in the solution which, with Andresen's α -naphthol-disulphonic acid, gives, in caustic alkaline solutions, a ponceau red dye.

PARA-PHENYL- ENDIAMINE.	Separated by ether and also from alkali caustic solutions.	Gives quinone on oxidation. Chloride of lime sol. produces in a sol. acidulated with hydrochloric acid, quinone dichloro- diamide, which separ- ates in yellow flocks.	Caustic alkalies.	The diazo compound of para- phenyl-endiamine gives with Andresen's <i>a</i> -naphthol-disul- phonic acid a red-violet colour (compare para-amidophenol). The shade of this dye is best determined by pouring some of of the sol. on filtering paper, and dropping dilute acetic acid on the place.
PYROGALLOL.	Sulpho-pyrogallol solutions become brown on addition of a few drops of caustic soda. Pyro is separ- ated by ether from sulphite sol., but not from sulphite and potash solutions.	Gives no quinone.	Alkali carbonates and ammonia.	If a dilute solution of pyro is mixed with a concentrated solu- tion of ferrous sulphate which has become superficially oxidised, there is formed after a short time a beautiful blue colour.
TRI-AMIDO- PHENOL.	A sulphite sol. is yel- lowish. By addition of potash the colour becomes green, by adding caustic alkali it becomes brown. The colours are very distinct if filtering paper be saturated with the solutions and exposed to the air.	One drop ferric- chloride sol. produces a dilute aqueous sol. a deep blue colour. No quinone formed.	Neutral alkaline sulphites.	

(aa) The brown colour remains and quickly increases=pyrogallol. Test further by special reactions.

(bb) The brown colour turns blue=di-amido-resorcin.

3. The solution remains clear and bright, without any colour—brenzcatechine, hydroquinone, metol, ortol, para-amidophenol (when very dilute), or para-phenyl-endiamine. Test the original substance as to the evolution of quinone by oxidation with potassium bichromate and sulphuric.

(a) If no quinone is formed=brenzcatechine. Test with ferric chloride and lead acetate.

(b) If quinone is formed by oxidation=hydroquinone, metol, ortol, para-amidophenol, para-phenyl-endiamine.

Add to the aqueous solution of the substance some dilute sulphuric acid and shake with ether.

(aa) If on the evaporation of the ether a residue of long needles is left=hydroquinone or ortol. Test for the same. If the hydroquinone comes from the ortol, the original substance will give, on oxidation, the Bordeaux red colour mentioned in the table.

(bb) There is no residue, or but little, after evaporation of the ether=metol, para-amidophenol, or para-phenyl-endiamine. Prepare a 1:20 solution of the substance, add some dilute sulphuric acid, and cool the solution by the addition of ice, and then add, with stirring, as much concentrated nitrite solution to make it smell of nitrous acid.

(aa) If a felted mass of fine needles, separates=metol. Test according to table.

(bb) If there is no separation=para-amidophenol or para-phenyl-endiamine. To some of the clear solution, containing nitrite, add some solution of α -naphthol-disulphonic acid (known also as Andresen's acid), made alkaline with caustic alkali.

1. The azo dye formed is of a ponceau red shade=para-amidophenol.

2. The azo dye formed is of a Bordeaux red colour=para-phenyl-endiamine.

B. THE DEVELOPER TO BE TESTED IS AN AQUEOUS SOLUTION.

As aqueous solutions of developing agents generally possess keeping properties only in the presence of sulphites, these will be found in all liquid developers. In order to test this, it is only necessary to acidulate a small quantity of the solution with dilute sulphuric, and the smell of sulphurous acid will prove the presence of sulphite.

To recognise the developing agent, place a small quantity of the original solution in a little dish, and add a little concentrated caustic soda lye.

(A) If the solution assumes gradually an intense colour on exposure to the air.

(a) If the colour is an intense blue=di-amido-resorcin, a small quantity of the original solution should be acidulated with dilute sulphuric acid, and the solution boiled to drive off the sulphuric acid, a couple of drops of ferric chloride solution, and strongly diluted with water. The solution will then assume the characteristic colour given in the table.

(b) The solution, when in contact with the air, quickly turns brown=pyrogallol, amidol, or tri-amidophenol. A small quantity of the

original solution should be placed in a dish, and a lot of dry carbonate of potash added.

1. The solution turns blue=amidol. Test further as with diamido-resorcin, or extract some of the original sulphite solution with ether, evaporate the latter, and dissolve the residue with water. Ferric chloride gives a red colour.

2. The solution turns brown on exposure to the air=pyrogallol. In order to confirm this, acidulate a small quantity of the original solution with hydrochloric acid extract with ether, dissolve the residue after evaporation of the ether in water, and test as suggested in the table with oxidised sulphate of iron.

3. The solution turns a smutty green=tri-amidophenol. In this case the original solution is more yellow than the former. Test further with ferric chloride, as suggested for di-amido-resorcin.

(b) Soda lye produces no marked change of colour=brenzcatechine, di-amido-oxyphenol, eikonogen, glycin, hydroquinone, metol, ortol, para-amidophenol, para-phenyl-endiamine.

Add to some of the original solution some hydrochloric acid, slowly and with constant stirring, and note if any separation takes place, and then note if the precipitate dissolves in excess of acid.

(a) If a white precipitate is formed=di-amido-oxyphenol, eikonogen, glycin, para-amidophenol.

1. The precipitate formed does not dissolve in excess of hydrochloric acid=eikonogen.

2. The precipitate dissolves on addition of more hydrochloric acid=di-amido-oxyphenol, glycin, and para-amidophenol.

(aa) The precipitate does not dissolve on addition of strong acetic acid=glycin.

(bb) The precipitate dissolves in excess of acetic acid=para amidophenol, di-amido-oxyphenol.

Acidulate a small quantity of the original solution with dilute sulphuric acid, drive off the free sulphuric acid by boiling, and add to the boiling hot solution some potassium bichromate.

(cc) The solution smells of quinone=para-amidophenol.

(dd) There is no smell of quinone=di-amido-oxyphenol.

(B) No precipitate is formed on the addition of hydrochloric acid to the original solution=brenzcatechine, hydroquinone, metol, ortol, or para-phenyl-endiamine.

Acidulate a small quantity of the original solution with hydrochloric acid, and shake with ether.

1. If a precipitate is left on evaporation of the ether=brenzcatechine, hydroquinone, ortol.

The residue gives quinone=hydroquinone or ortol. Acidulate a small quantity of the original solution with sulphuric acid, boil off the free sulphurous acid, and oxidise with potassium bichromate. If the red colour mentioned in the table appears, it is ortol; in the other case, hydroquinone.

(b) The residue gives quinone=brenzcatechine. Test with ferric chloride and acetate of lead.

2. If there is no marked residue on evaporation on the ether=metol or para-phenyl-endiamine. Acidulate a small quantity of the original solution with dilute sulphuric acid, boil off the free sulphurous acid,

and add to the liquid cooled with ice some solution of nitrate till it smells of nitrous acid.

(a) If, after the addition of the nitrate, a compound separates out caustic alkaline solution with α -naphthol- ϵ disulphonic acid. (nitros-metol)=metol. This is proved by no colour being formed in a

(b) The solution containing nitrate gives, when poured into a caustic alkaline solution of α -naphthol ϵ disulphonic acid, a red-violet colour=paraphenyl-endiamine.

In the above notes the method of analysis is given when only one developing agent is present in the secret preparation. It is rather more trouble when two or more reducing agents are present; still the data in the table will be of some assistance, and they may be tested for separately.

GEOLOGICAL PHOTOGRAPHS.

THIS Committee was appointed by the British Association for the Advancement of Science in 1889, for the purpose of arranging for the collection, preservation, and systematic registration of photographs of geological interest in the United Kingdom.

Since its formation the Committee has been successful in obtaining a number of photographs, of which 2000 were received and registered up to the month of August, 1898, when the ninth report was presented at the Bristol meeting of the British Association.

The collection cannot yet be regarded as in any sense complete, for many districts are still poorly represented in it. A great effort is being made to fill up the numerous lacunæ.

The Committee would, therefore, urge upon geologists and photographers the desirability of further assisting the scheme, with the object of completing a national collection of photographs to illustrate the geology of our own country.

The collection has been deposited at the Museum of Practical Geology, 28, Jermyn Street, London, where it is accessible to the public for purposes of reference.

It is desired to obtain photographs illustrative of characteristic rock exposures, especially those of a typical character or temporary nature; important boulders; localities affected by denudation, or where marked physiographical changes are or have been in operation; landslips; raised beaches; old sea-cliffs and other conspicuous instances of marine erosion; characteristic river valleys or escarpments, and the like; types of rock-structure, jointing, folding, and faulting; glacial phenomena, such as *roches moutonnées*, moraines, drums, and eskers; or any natural views of geological interest. Photographs of microscopical sections and typical hand specimens of rocks and fossils are also admissible.

It is important that copies of photographs which have been processed for illustrating articles and papers in journals should be deposited in the collection; they should be accompanied by an exact reference to the publication, and, if possible, a copy of the plate.

Duplicate collections of about 200 prints and about 100 slides have been formed, and the Secretary will gladly forward either or both of them to any local society that contemplates joining in the work, or wishes to see what has already been done.

APPARATUS FOR GEOLOGICAL PHOTOGRAPHY.

The Committee has had under consideration the question of the most suitable form of camera for geological field work. The following is a *précis* of communications from experts who have been invited to offer suggestions on the subject.

The *best camera* to use is probably that to which the worker is himself most accustomed. These hints are added for those who have not yet adopted any particular camera.

The camera should be as light as possible, but *rigidity* when set up is absolutely necessary.

Double swing-back and rising and falling front are essential, to allow of correct perspective and the true rendering of lines and curves.

The camera should admit of long extension to permit the use of lenses of various *foci*.

It is sometimes desirable to take photographs of inclined or horizontal rock-surfaces at distances of a few feet, for the purpose of showing minor features, such as veins, glacial markings, structures of gneissose rocks, &c. To effect this, two boards hinged together with some arrangement for fixing them at the desired angle are all that is required. The lower board must, of course, be screwed to the stand and the upper one to the camera.

A spirit level should be used with the camera or attached to it.

It is well to have three lenses: (1) A rapid rectilinear doublet of 10 to 12-inch focus (for half-plate size); (2) a wide-angle meniscus, focal length about 6 to 7 inches, for interiors of quarries and craters; and (3) a long-focus lens of focal length equal to three or four times the length of the plate, for distant hills and inaccessible cliffs.

If only one lens is used, it should be a rapid rectilinear of about 9-inch focal length (for half-plate size), and should be by some reputable maker. It must be the best of its kind obtainable. Though films materially decrease the weight to be carried, they are not recommended for general use; plates should be used whenever possible. Good general work can be done with a quarter-plate or 5 x 4 camera, and subsequent enlargement on bromide paper. In this case it is essential that the lens should be of first-rate make, and be used with a small stop. For direct printing, the cold-bath platinotype method is recommended as the most permanent, and it is now very easy to work.

It is advisable, when measurements are unattainable, that a "scale object" should be included in the photograph. (A hammer is sometimes used, but it is not suitable; a walking-stick or a human figure seems to be satisfactory.)

RECOMMENDATIONS FOR THE COLLECTION OF GEOLOGICAL PHOTOGRAPHS.

(1) Societies are urged to form small committees for the purpose of noting sections suitable to be photographed, and arranging such work as may be possible in each district. To this end it is anticipated that the services of many amateur photographers may be secured.

(2) Size of photograph recommended, $8\frac{1}{2} \times 6\frac{1}{2}$ inches ("whole-plate"); but this is *optional*. In view of the difficulty of carrying a heavy camera and plates, it is not desired to exclude smaller views when these are well defined and clear. In the case of small negatives, when sharp, an enlargement to whole-plate size is desirable. The views should be printed by a permanent process whenever practicable. Isochromatic plates are strongly recommended.

(3) In order to preserve its scientific value, each photograph should be

accompanied by *as many* of the following details *as can be conveniently given*. Forms for this purpose will be supplied on application.

(a) Name and position of section or locality.

(b) Special features shown, with illustrative diagrams when necessary. (Further details may be given, if more convenient, on a separate tracing.)

[*Reduced Copy of FORM A.*]

FORM A		Loca No.	
BRITISH ASSOCIATION COMMITTEE ON GEOLOGICAL PHOTOGRAPHS.			
County.	Photographed under the direction of		
Name and position of Locality or Section.			
Special features shown.			
Details of Section.	Height.	Compass Direction. Camera Pointing.	"In shade" or "direct light."
	Length.			Time: a.m. p.m.
Sketch, or other particulars, if necessary, may be given here:—			
Name of Photographer.	Data photographed.		Registered No.
Address.			

* This number should also be placed on the back of the Photograph.

NOTE.—Copies of the above Form will be supplied on application to the Secretary, to enable the Donors of Photographs to insert the requisite particulars.

(c) Height and length of section, and compass direction. If possible, a scale of some kind should always be given.

(d) Name and address of photographer, or of the society under whose direction the view is taken.

(e) Date when photographed.

(f) Indication of direction of light and shade; *i.e.*, state whether taken in "direct light" or "in shade."

(4) Each photograph sent in for registration should bear a *local* number, and the accompanying form should be numbered at the top right-hand corner in accordance therewith.

(5) Photographs should be sent *unmounted*. This is essential in order to secure the proper geographical arrangement of the collection. They will be mounted by the Committee on cards of uniform size, with perforated edges for binding, to hold one whole-plate, two half-plate, or four quarter-plate views.

(6) Copies of photographic prints, lists of photographs, and information relative thereto, should be sent under cover to the Secretary of the Committee, at the earliest possible date, in order to facilitate the work of registration. They should be sent in *not later than August 1* in each year.

(7) It adds very much to the usefulness of the collection when amateurs are willing to place their negatives, or copies of them, in the hands of a professional photographer, with instructions to supply prints or lantern slides, at a price, to those who apply for them. The Secretary would willingly help in giving advice on this point, as he is frequently asked where copies of the contributed prints can be obtained.

Detailed lists of photographs officially received are published in the annual reports of the Committee, which also states where the photographs may be obtained. These reports are published in the "Annual Report" of the British Association, and a copy will be forwarded to the donor of each photograph.

Further information may be obtained from the members of the Committee, or from the Secretary, W. W. Watts, Mason University College, Birmingham, to whom communications should be addressed.

TABLE FOR CONVERTING GRAINS AND DROPS PER OUNCE
INTO GRAMMES PER LITRE AND *VICE VERSA*.

1000 : 480	1000 : 437½		437½ : 1000	480 : 1000
2½	7¼	1	7	2½
2½	7¼	1	10	2½
2½	7¼	1	11	2½
2½	7¼	1	12	2½
2½	7¼	1	13	2½
2½	7¼	1	14	2½
2½	7¼	1	15	2½
2½	7¼	1	16	2½
2½	7¼	1	17	2½
2½	7¼	1	18	2½
2½	7¼	1	19	2½
2½	7¼	1	20	2½
2½	7¼	1	21	2½
2½	7¼	1	22	2½
2½	7¼	1	23	2½
2½	7¼	1	24	2½
2½	7¼	1	25	2½
2½	7¼	1	26	2½
2½	7¼	1	27	2½
2½	7¼	1	28	2½
2½	7¼	1	29	2½
2½	7¼	1	30	2½
2½	7¼	1	31	2½
2½	7¼	1	32	2½
2½	7¼	1	33	2½
2½	7¼	1	34	2½
2½	7¼	1	35	2½
2½	7¼	1	36	2½
2½	7¼	1	37	2½
2½	7¼	1	38	2½
2½	7¼	1	39	2½
2½	7¼	1	40	2½
2½	7¼	1	41	2½
2½	7¼	1	42	2½
2½	7¼	1	43	2½
2½	7¼	1	44	2½
2½	7¼	1	45	2½
2½	7¼	1	46	2½
2½	7¼	1	47	2½
2½	7¼	1	48	2½
2½	7¼	1	49	2½
2½	7¼	1	50	2½
2½	7¼	1	51	2½
2½	7¼	1	52	2½
2½	7¼	1	53	2½
2½	7¼	1	54	2½
2½	7¼	1	55	2½
2½	7¼	1	56	2½
2½	7¼	1	57	2½
2½	7¼	1	58	2½
2½	7¼	1	59	2½
2½	7¼	1	60	2½
2½	7¼	1	61	2½
2½	7¼	1	62	2½
2½	7¼	1	63	2½
2½	7¼	1	64	2½
2½	7¼	1	65	2½
2½	7¼	1	66	2½
2½	7¼	1	67	2½
2½	7¼	1	68	2½
2½	7¼	1	69	2½
2½	7¼	1	70	2½
2½	7¼	1	71	2½
2½	7¼	1	72	2½
2½	7¼	1	73	2½
2½	7¼	1	74	2½
2½	7¼	1	75	2½
2½	7¼	1	76	2½
2½	7¼	1	77	2½
2½	7¼	1	78	2½
2½	7¼	1	79	2½
2½	7¼	1	80	2½
2½	7¼	1	81	2½
2½	7¼	1	82	2½
2½	7¼	1	83	2½
2½	7¼	1	84	2½
2½	7¼	1	85	2½
2½	7¼	1	86	2½
2½	7¼	1	87	2½
2½	7¼	1	88	2½
2½	7¼	1	89	2½
2½	7¼	1	90	2½
2½	7¼	1	91	2½
2½	7¼	1	92	2½
2½	7¼	1	93	2½
2½	7¼	1	94	2½
2½	7¼	1	95	2½
2½	7¼	1	96	2½
2½	7¼	1	97	2½
2½	7¼	1	98	2½
2½	7¼	1	99	2½
2½	7¼	1	100	2½

When a number in the central column is that of the grains per avoirdupois ounce, the proportionate number of grammes per litre will be found next to it on the *right* hand.

When a number in the central column is that of the grammes per litre, the proportionate number of grains per avoirdupois ounce will be found next to it on the *left* hand.

Thus, 70 grains per ounce (central column) are equivalent to 160 grammes per litre (right hand).

Again, 16 grammes per litre (central column) are equivalent to 7 grains per avoirdupois ounce (left hand).

The outer columns may be used in conjunction with the central one in the same way, to convert drops per fluid ounce into c.c. per litre and *vice versa*.

WEIGHTS AND MEASURES.

By the Weights and Measures Act, 1878 (41 and 41 Vict., c. 49), every contract, bargain, or dealing, for any work done, goods, wares, or merchandise sold, &c., by weight or measure, shall be according to the weights or measures ascertained by this Act, and, if not so made, shall be void.

No local or customary measures, nor the use of heaped measure, shall be lawful.

Any person who sells by any denomination of weight or measure other than one of the Imperial weights or measures, shall be liable to a fine of 40s. for every such sale.

All articles sold by weight shall be sold by Avoirdupois weight; except that—

1. Gold and silver, and articles made thereof, also platinum, diamonds, and other precious metals or stones, may be sold by the oz. Troy, or the decimal parts of such oz.

2. Drugs, when sold by retail, may be sold by Apothecaries' weight.

Nothing in this Act shall prevent the sale or subject a person to a fine for the sale of an article in any vessel not represented as containing any amount of Imperial measure.

Every person who uses or has in his possession for use for trade, a weight or measure which is not of the standard denomination, shall be liable to a fine of £5, and for a second offence £10.

UNJUST WEIGHTS AND MEASURES.

Every person who uses or has in his possession for use for trade, any weight, measure, or scale, &c., which is false or unjust, shall be liable to a fine of £5, and for a second offence, £10; and any contract, sale, or dealing made by the same shall be void.

STAMPING AND VERIFICATION OF WEIGHTS AND MEASURES.

All weights and measures must have the denomination thereof stamped thereon.

Every weight and measure whatsoever, used for trade, shall be verified and stamped, by an inspector, with a stamp of verification.

Any person who uses, or has in his possession for use, for trade, any measure or weight, not duly stamped, shall be liable to a fine of £5 for the first offence, and £10 for the second.

The above has been extracted from "Every Man's Own Lawyer." We may add that the working of the Act is under the Board of Trade, and that all details are prescribed by Orders in Council. The King in Council has power to sanction certain things, and by an Order of this sort, dated 19th May last, the use of Metric weights and measures was sanctioned. The making of Metric standards was sanctioned by the Weights and Measures Act, of 1897. The equivalents to be used in future (in lieu of those prescribed by the Act of 1878) are directed in a subsequent Order, and are those given in p. 582 of the ALMANAC for last year.

FORMULÆ.

WITH the view of enabling readers of the ALMANAC to find any particular one of the following numerous Formulæ or Tables, we give below an Index to the Contents of this section of the ALMANAC, which will doubtless facilitate reference.

	PAGE		PAGE
About Weights and Measures	1077	Enlargements, Tables for ...	1183
Albumen Paper.....	1100	Equivalence of the Alkalies	1159
—Toning Baths for	1100	Foci, Equations relating to	1186
Collodio-bromide Processes	1113	Gelatino-chloride Process ...	1067
—Developers for.....	1114	—Toning Baths for.....	1067
Collodio-chloride Paper.....	1099	Hypo Eliminators, &c.....	1107
Developing Formulæ :		Intensifiers	1103
Acetone Pyro.....	1088	Lantern Projection, Table of	
Aduröl	1089	Distances for	1187
Amidol	1085	Miscellaneous Formulæ and	
Diogen	1090	Recipes	1115
Diphenal	1088	Objects in Motion, Table	
Eikonogen	1085	showing Displacement of	
Ferrous Oxalate	1081	on Ground Glass	1180
Glycin.....	1083	Orthochromatic Processes... ..	1106
Hydroquinone	1086	Reducers	1105
Kachin	1089	Relative Exposure Table ...	1173
Metol	1081	Silvering Mirrors.....	1115
Ortol ..	1088	Silver Salts, Solubility of... ..	1162
Pyro	1080	Solubilities, Table of	1168
Pyrocatechin.....	1085	Standards, Royal Photo-	
Developing Formulæ of the		graphic Society's.....	1181
Principal Plate and Paper		Stops, Continental, and their	
Makers	1122	U.S. Equivalents	1179
Diaphragms, Standard	1178	Sun's Position, Tabeshowing	
Distances, Tables of, at and		Variation of	1176
which objects are in Focus	1190	Symbols, Tables of Chemical	1163
Dry-collodion Processes.....	1112	Thermometric Tables	1171
Dusting-on Formulæ	1115	'U.S.' System of Numbering	
Emulsion Calculations, Ta-		Stops	1175
bles for Simplification of	1160	Varnishes	1108
Enlargements, Exposure for	1173	View Angles	1184
		Wet-collodion Process.....	1110
		—Developers.....	1111

ABOUT WEIGHTS AND MEASURES

The inconveniences of the English system of weights and measures has long been felt by all who are engaged in any form of research. It is not a question of the units so much as of their divisions. If it were only a matter of English convenience, there would probably be little desire to change the pound and the yard, which are our standards, and it would only be a question of dividing them suitably. But decimal division and multiplication of these units, or their subordinate ones, is practically impossible to avoid, and no one can help feeling the advantage which would follow from universal decimalisation, at least no one who has much to do with the calculations necessary for modern science, which reduces all things to number, weight, and measure. If this decimalisation were taken in hand with our present units (standards), it would be necessary to devise new names for some subordinate units, and to make them such as would clearly distinguish them from the old system. No one surely would seriously propose to deliberately add to the confusion we already enjoy of having two ounces, three drachms, and two pounds (not to speak of the monetary unit represented by a sovereign) which are a constant source of confusion, even though some of these are not sanctioned by law. Besides, if we retain our units, we should still be under the disadvantage in our commerce of differing in our units from all our neighbours, and in our science of want of ready connexion between our units of length and weight. There have been several suggestions made for decimalising our weights; of these the best probably was that the avoirdupois pound, of 7,000 grains, should be divided into 1,000 parts, to be called septems, and that the measure of fluids should correspond to a pound of pure water and be divided similarly, but nothing has ever come of this. Recently, indeed, a proposal was made to adopt a new pound of 8,000 grains, divided into 16 ounces of 500 grains each, thus adding to our confusion for the sole purpose of getting an ounce of a round number of grains, for it is difficult to see what other gain there would be.

If there is to be a change, then, the new system should be free from as many as possible of the disadvantages of what we have, and not be liable to require further modification. One solution only seems possible, and that is that Englishmen take the advice of, and follow the practice of, the most scientific portion of their body, and adopt the metric system in its entirety. The units are not practically inconvenient, nor are the names of them really difficult to deal with; and, if they were so, objections would come with a bad grace from photographers, whose journals teem with words of Greek and Latin derivation, awful to look at and far worse to pronounce than kilo, gramme, metre, litre, or c. c.

Whether our readers are prepared to go the whole length with us or

no (and the retention of the old forms should meet the convenience of the most conservative) we think there is another convenience arising from the step now taken. It must be well known to all that the use of percentages, and even of what are called parts, has become a practice in photographic work. What the advantage of parts, as lately used, is we fail to see; but the use of percentages is a practical confession of the advantage of decimilation. It is proposed to adopt here one uniform quantity of the solution to be made up, that is the litre of 1000 cubic centimetres, and containing 1000 grammes of pure water. The quantities of each constituent will be given in grammes or cubic centimetres (c. c.), according as it is solid or fluid, and, as a rule, fractions of a gramme will be neglected.

The English grains per ounce have been converted into grammes per litre by multiplying them by 16.7, and drops per ounce into c. c. per litre by the factor 25.12.

It has been suggested that the accuracy of these conversions is excessive, but it has been thought better to leave the expert to adopt more convenient figures, rather than to make the author of a formula responsible in appearance for what he did not sanction. In a few cases where the author has given his formula both in English and metric form, his equivalents have been adhered to, and it is hoped that this practice will be more general in future.

Those who prefer percentages will find their wants met if they bear in mind that one-tenth of the quantities given will make 100 c.c. of solution, and be, in fact, percentages. The gentlemen who wish to make use of parts will find that, by reading *parts* for grammes or c. c. they will have formulæ quite as accurate as those they have been in the habit of using.

In some cases there is a doubt whether the author of a formula means that the solution should be made up to the quantity directed to be made, or whether he means the amount of water specified to be added. It would be accordant with uniformity to take the latter view; in many cases it does not much matter which is taken, but when there is a large quantity of water of crystallisation in the substance used, it may be material, and it would be very desirable if all photographers would distinctly state which mode of mixing they mean to be followed. Where sodium sulphite, for instance, is employed in crystals, no less than half the weight is water. In this common salt it is stated in the Solubility Tables that a saturated solution contains twenty-five per cent., but much stronger solutions are prescribed, in one case fifty per cent. is ordered in a standard work on our art. In this case, if 5 parts of salt (in crystals) is dissolved in hot water and the solution made up to 10 parts, we have virtually 2.5 parts of the anhydrous salt in the 10 parts, that is, a twenty-five per cent. solution, saturated at ordinary temperatures but liable to change when it is cold; but if 10 parts of water are used to dissolve the 5 of salt, the solution will only contain twenty per cent. of anhydrous salt, and probably would always be unchanged in any work-room.

TABLE FOR THE CONVERSION OF ENGLISH WEIGHTS AND MEASURES IN THE METRICAL SYSTEM.*

LIQUID MEASURE.				LINEAL MEASURE.			
Minims.	c.cm.	Minims.	c.cm.	Inches.	Feet.	Yards.	Fathoms.
1	0.0591	53	3.1352				
2	0.1183	54	3.1943				
3	0.1775	55	3.2535				
4	0.2366	56	3.3126				
5	0.2957	57	3.3718				
6	0.3549	58	4.4309				
7	0.4141	59	3.4901				
8	0.4732	60	3.5492				
9	0.5324						
10	0.5915	Drachms.	c.cm.				
11	0.6507	1	3.5492				
12	0.7098	2	7.0985				
13	0.7690	3	10.6477				
14	0.8282	4	14.1970				
15	0.8873	5	17.7462				
16	0.9465	6	21.2954				
17	1.0056	7	24.8447				
18	1.0648	8	28.3939				
19	1.1239						
20	1.1831	Ounces.	c.cm.				
21	1.2422	1	28.394				
22	1.3014	2	56.788				
23	1.3605	3	85.182				
24	1.4197	4	113.576				
25	1.4789	5	141.970				
26	1.5380	6	170.364				
27	1.5972	7	198.757				
28	1.6563	8	227.151				
29	1.7155	9	255.545				
30	1.7746	10	283.939				
31	1.8338	11	312.333				
32	1.8929	12	340.727				
33	1.9521	13	369.120				
34	2.0112	14	397.515				
35	2.0704	15	425.909				
36	2.1295	16	454.303				
37	2.1887	17	482.697				
38	2.2478	18	511.091				
39	2.3070	19	539.484				
40	2.3662	20	567.878				
41	2.4253						
42	2.4845	Pints.	c.cm.				
43	2.5436	1	567.9				
44	2.6028	2	1135.8				
45	2.6619	3	1703.6				
46	2.7211	4	2271.5				
47	2.7802	5	2839.4				
48	2.8394	6	3407.3				
49	2.8985	7	3975.1				
50	2.9577	8	4543.0				
51	3.0169						
52	3.0760						

1 = 0.033 = 0.0278 = 0.0139 = 0.0254				
12 = 1 = 0.333 = 0.1667 = 0.3048				
36 = 3 = 1 = 0.5 = 0.9144				
72 = 6 = 2 = 1 = 1.8287				

AVOIRDUPOIS WEIGHT INTO GRAMMES.			
Drachms.	Ounces.	Pounds (lbs.)	g.
1 = 0.0625 = 0.0399 = 1.77185			
16 = 1 = 0.0625 = 28.3495			
256 = 16 = 1 = 453.59			

APOTHECARIES' WEIGHT.					
Grains.	Scruples.	Drachms.	Ounces.	Pounds.	g.
1	0.05	0.0167	0.00209	0.00017	0.0648
20	1	0.334	0.0418	0.00347	1.2963
60	3	1	0.125	0.01042	3.8879
480	24	8	1	0.08333	31.103
5760	288	96	12	1	373.236

* See also pp. 671-674; 1074-75.

DEVELOPING FORMULÆ FOR GELATINE DRY PLATES, ETC.

THE following are a few of the typical formulæ that are generally employed for development, &c.; a much greater variety will be found in the section headed "Developing Formulæ of the Principal Plate-makers" (p. 1122 *et seq.*), to which we also refer the reader.

PYRO SODA.

No. 1. A. Sulphite of soda	6 ounces	188 grammes.
Water.....	32 "	1000 c. c.
Pyrogallie acid.....	1 ounce	31 grammes.

(Having dissolved the sulphite of soda, add sufficient citric acid in solution to cause a piece of blue litmus paper inserted therein to become reddened.)

B. Carbonate of soda	3 ounces	94 grammes.
Carbonate of potash	1 ounce	31 "
Water.....	32 ounces	1000 c. c.

When about to develop, mix these in equal proportions with two parts the bulk of water, or, if the weather be *very* hot at the time, even a greater proportion of water.

No. 2. A. Sulphite of soda (crystals)	2 ounces	166 grammes.
Citric acid.....	60 grains	11 "
Ammonium bromide	40 "	8 "
Pyro	1 ounce	83 "
Water.....	12 ounces	1000 c. c.
B. Sulphite of soda (crystals)	2 ounces	166 grammes.
Carbonate potassium (crys.)	3 "	250 "
Water.....	12 "	1000 c. c.

To develop, use 1 drachm (or 6 c. c.) of each to 2 ounces (or 100 c. c.) of water.

PYRO AND AMMONIA.

No. 1. Strong liquid ammonia	2 ounces	25 c. c.
Bromide potassium	300 grains	9 grammes.
Water	80 ounces	1000 c. c.
No. 2. Pyrogallie acid	20 grains	4.6 grammes.
Water	10 ounces	1000 c. c.
Nitric acid	2 drops	0.5 ,

For use take equal parts.

FERROUS OXALATE.

- No. 1. Saturated solution of sulphate of iron..... 1 part.
 Saturated solution of oxalate of potash 3 parts.
 Mix *quant. suff.* by pouring the iron into the oxalate. In hot weather the proportion of the iron solution may be diminished with advantage

FOR TRANSPARENCIES ON GELATINO-CHLORIDE PLATES.

- No. 2. A. Neutral oxalate of potash 2 ounces 100 grammes.
 Chloride of ammonium ... 40 grains 4.5 "
 Distilled water..... 20 ounces 1000 c.c.
 B. Sulphate of iron 4 drachms 34 grammes.
 Citric acid..... 2 " 17 "
 Alum 2 " 17 "
 Distilled water..... 16 ounces 1000 c.c.
 For black tones mix the above in equal volumes.

METOL.

SINGLE-SOLUTION DEVELOPER.

Metol	40 grains	11 grammes.
Sulphite of soda	120 "	34 "
Hydroquinone	48 "	14 "
Carbonate of potash	240 "	69 "
Water.....	8 ounces	1000 c.c.

Apply heat if necessary to dissolve the metol, and afterwards add the sulphite, and allow that to dissolve before adding the other ingredients.

For use under normal conditions, one part of the above is to be diluted with three parts of water.

TWO-SOLUTION DEVELOPER.

A. Metol.....	40 grains	11 grammes.
Hydroquinone.....	48 "	14 "
Sulphite of soda.....	120 "	34 "
Water	8 ounces	1000 c.c.
B. Carbonate of potash	1 ounce	13 grammes.
Water	1 quart	1000 c.c.

For use, mix one part of A with three parts of B for ordinary exposures; for over-exposures use less of B, or else add a few drops of a ten per cent. solution of bromide of potassium, or of a five per cent. solution of citric acid; for slight under exposure, increase B.

ILFORD

ORDINARY PLATES

POPULAR
PRICES.

BEST PLATES FOR ALL-ROUND WORK.
EXTREME LATITUDE.

Admirable Results without Trouble.

ILFORD, LIMITED, ILFORD, LONDON, E.

THREE-SOLUTION DEVELOPER.

A. Metol	40 grains	11 grammes.
Sulphite of soda	120 "	34 "
Water	8 ounces	1000 c. c.
B. Hydroquinone	40 grains	11 grammes.
Citric acid	10 "	3 "
Water	8 ounces	1000 c. c.
C. Carbonate of potash.....	1 ounce	50 grammes.
Water	20 ounces	1000 c. c.

For use under similar conditions to those already mentioned, take one part each of A and B and two parts of C.

METOL-HAUFF.

Solution A.

Water	100 parts	1000 c. c.
Metol	1 part	10 grammes.
Soda sulphite.....	10 parts	100 "

Solution B.

Water	100 parts	1000 c. c.
Carbonate potash (or substitute)	10 "	100 grammes.
C ystallised carbonate soda ...	20 "	200 "

For use, three parts A to one of B.

METOL-ANDRESEN.

Water	1 quart	1000 c. c.
Metol	$\frac{8}{4}$ ounce	19 grammes.
Sulphite of soda	7 ounces	175 "
Carbonate of potash	$3\frac{1}{2}$ "	88 "
Bromide of potassium	$\frac{1}{10}$ ounce	2.5 "

For use, take one part of developer to three of water.

ILFORD

EMPRESS PLATES

POPULAR
PRICES.

THE PLATE FOR THE STUDIO.
FINE GRAIN.

ILFORD, LIMITED, ILFORD, LONDON, E.

To photographers who prefer to work with separate solutions the following is recommended:—

A. Water.....	1 quart	1000 c. c.
Metol.....	$\frac{1}{2}$ ounce	19 grammes.
Sulphite of soda	7 ounces	175 „
B. Water.....	3 quarts	1000 c. c.
Carbonate of soda	7 ounces	58 grammes.

One part of A is mixed with three parts of water for use, bromide of potassium being as required for the prevention of fogging.

ANDRESEN'S GLYCIN.

I. For soft development:

Solution A (warm slightly).

Glycin	4 parts	40 grammes.
Carbonate of Potash	$1\frac{1}{2}$ „	15 „
Sulphite of soda (cryst.) ..	12 „	120 „
Water	100 „	1000 c. c.

Solution B.

Carbonate of Potash	10 parts	100 grammes.
Water	100 „	1000 c. c.

For use mix one part of A with two parts of B.

II. For hard development:

Glycin	5 parts	50 grammes.
Carbonate of potash	25 „	250 „
Sulphite of soda (cryst.) ..	25 „	250 „
Water	100 „	1000 c. c.

For use to be diluted three times its volume.

GLYCIN-HAUFF.

The concentrated developer is made up as follows:—350 grains (80 grammes) of sodium sulphite crystal are dissolved by heat in one ounce (100 c. c.) of water, 150 grains (35 grammes) of glycin are then added, and the mixture is to be heated to boiling point, and one and a half ounces (150 grammes) of potash carbonate are added (begin adding the potash in small quantities, on account of the carbonic acid gas). When cold, this concentrated developer—forming a thin, pasty solution—may be kept as stock. For use, shake the solution first, and dilute the required quantity twelve times for ordinary purposes. For use when development is to be left to itself, the stock solution is diluted fifty times.

ILFORD SPECIAL RAPID PLATES

POPULAR
PRICES.

EXTREME SPEED.
EXTREME EASE.
UNRIVALLED FOR SNAP-SHOTS.

ILFORD, LIMITED, ILFORD, LONDON, E.

A ONE-SOLUTION FORMULA.

Sodium sulphite.....	40 grains	23 grammes.
Glycin	20 "	11 "
Potassium carbonate	80 "	46 "
Water	4 ounces	1000 c. c.

PARAMIDOPHENOL.

Paramidophenol is the basis of rodinal and can be prepared either as a one or two-solution developer; the former when made with caustic alkalis is specially suitable for negative work, whilst the latter made with the carbonate alkalis is more suitable for positives.

Two-solution formula.

A. Paramidophenol hydrochloride.	$\frac{1}{2}$ ounce	20 grammes.
Potassium metabisulphite	$\frac{1}{4}$ "	10 "
Water	25 ounces	1000 c. c.
B. Sodium sulphite.....	$1\frac{1}{2}$ ounces	60 grammes.
Potassium carbonate.....	$1\frac{1}{2}$ "	60 "
Water	25 "	1000 c. c.
For use mix 1 part A with 2 parts B.		

Single-solution.

Potassium metabisulphite	$\frac{3}{4}$ ounce	30 grammes.
Distilled water	$2\frac{1}{2}$ ounces	100 c. c.
Paramidophenol	$\frac{1}{4}$ ounce	10 grammes.

Stir the solution and add gradually

Saturated solution caustic soda *q.s.*

till the precipitate first formed is redissolved.

For use dilute with from 10 to 30 parts of water.

PARA-AMIDOPHENOL.

Para-amidophenol chlorhydrate ...	48 grains	5 grammes.
Crystallised carbonate of sodium...	1 oz.	50 "
Crystallised sulphite of sodium ...	1 oz.	50 "
Water	20 ozs.	1000 "

For use, dilute with an equal bulk of water.

Para-amidophenol hydrochlorate	60 grains	7 grammes.
Sodium sulphite	60 "	7 "
" carbonate	400 "	46 "
Water.....	20 ounces	1000 c.c.

ILFORD

CHROMATIC PLATES

POPULAR
PRICES.

The FINEST Isochromatic or Orthochromatic Plates made.
UNIQUE IN THEIR CORRECT RENDERING
OF COLOUR-VALUES IN MONOCHROME.

ILFORD, LIMITED, ILFORD, LONDON, E.

DR. ANDERSEN'S FORMULA.

Para-amidophenol chlorhydrate	77 grains	8 grammes.
Sodium sulphite	768	80 "
" carbonate	384	40 "
Water	20 ozs.	1000 c.c.

PYROCATECHIN.

A. Pyrocatechin.....	192 grains	20 grammes.
Sodium sulphite	1½ ounces	80 "
Distilled water.....	20 "	1000 c.c.
B. Potassium carbonate	2 ounces	100 grammes.
Distilled water.....	18 "	1000 c.c.

For use, mix 1 part of A with 2 parts of B.

Another formula containing sufficient phosphate and caustic soda to form sodium tribasic phosphate, is the following:—

A. Pyrocatechin.....	192 grains	20 grammes.
Sodium sulphite	4 ounces	100 "
Distilled water	20 "	1000 c. c.
B. Sodium phosphate.....	450 grains	47 grammes.
Caustic soda	48	4 "
Distilled water	20 "	1000 c. c.

For use mix 1 part A, 1 part B, and 1 part water.

AMIDOL.

Amidol.....	80 grains	23 grammes.
Sodium sulphite.....	800 "	230 "
Water	8 ounces	1000 c. c.

For use, one ounce of the solution is diluted with three ounces of water, with one and a half grains of potassium bromide to the ounce of developer.

EIKONOGEN.

No. 1. A. Crystalline sulphite of soda ...	384 grains	40 grammes.
Eikonogen	125 "	13 "
Distilled water.....	10 ozs.	500 c. c.
B. Carbonate of potash (or calcined soda)	1½-1¾ oz.	60 to 75 grammes.
Distilled water	10 ozs.	500 c. c.

For use, mix equal volumes of A and B.

ILFORD

PROCESS AND HALF-TONE PLATES

POPULAR
PRICES.

THE BEST PLATES FOR ALL
PHOTO-MECHANICAL
WORK.

ILFORD, LIMITED, ILFORD, LONDON, E.

ONE-SOLUTION DEVELOPER.

Sulphite of soda in crystals.....	8 ounces	100 grammes.
Carbonate of soda in crystals...	3 "	38 "
Distilled water	80 "	1000 c. c.
Eikonogen	1 ounce	13 grammes.

HYDROQUINONE.

No 1.	Hydroquinone	1 part	15 grammes.
	Sulphite of soda	2 parts	30 "
	Carbonate of soda.....	10 "	150 "
	Water	67 "	1000 c. c.
No. 2.	A. Hydroquinone	4 grains	9 grammes.
	Metabisulphite of potash...	4 "	9 "
	Bromide of potassium	1 grain	23 "
	Distilled water	1 ounce	1000 c. c.
	B. Potassium hydrate	10 grains	23 grammes.
	Distilled water	1 ounce	1000 c. c.
	Equal parts of A and B.		

With some plates the bromide may be omitted.

No. 3.	A. Hydroquinone.....	80 grains	9 grammes.
	Citric acid	10 "	14 "
	Sulphite of soda (recrystal.)	80 "	9 "
	Distilled water	20 ounces	1000 c. c.
	B. Caustic potash (fused).....	160 grains	18 grammes.
	Sulphite of soda	160 "	18 "
	Distilled water	20 ounces	1000 c. c.
	C. Bromide of potassium	24 grains	55 grammes.
	Distilled water	1 ounce	1000 c. c.
	D. Caustic potash	160 grains	18 gramme
	Distilled water	20 ounces	1000 c. c.

For normal exposures use equal parts of A and B, adding five minims of C for every ounce of solution, or one per cent. of C.

For over-exposed plates use D instead of B, with an extra quantity of C.

For under-exposed plates omit C, and in extreme cases add six or eight grains more of sulphite of soda to each ounce of the developer. The object of increasing or decreasing the quantity of sulphite is to give greater or lesser density.

ILFORD

"Special" and "Alpha" LANTERN PLATES

POPULAR BRILLIANT SLIDES—"Special" for Cold Tones;
PRICES. "Alpha" for a Wide Range of Warm Tones.
The "Alpha" Lantern Plate is the ONLY Plate of its kind.

ILFORD, LIMITED, ILFORD, LONDON, E.

No. 4. A.	Hydroquinone.....	160 grains	18 grainths.
	Sulphite of soda.....	2 ounces	100 "
	Citric acid	60 grains	7 "
	Bromide of ammonium ...	20 "	2 "
	Water to	20 ounces	1000 c.c.
B.	Carbonate of potash.....	2 ounces	100 grammes.
	Carbonate of soda (crystal)	2 "	100 "
	Water to	20 "	1000 c.c.

Take equal parts.

No. 5. A.	Hydroquinone	15 grains	7 grammes.
	Sulphite of soda	75 "	35 "
	Water.....	5 ounces	1000 c.c.
B.	Carbonate of potash.....	90 grains	41 grammes.
	Water.....	5 ounces	1000 c.c.

C. Ten per cent. solution of bromide of potassium.

Use equal parts of A and B, and add two or three minims of C. With some plates no bromide restrainer will be required.

No. 6.	Sulphite of soda	4 ounces	40 grammes.
	Hydroquinone	$\frac{1}{2}$ ounce	5 "
	Carbonate of soda	$7\frac{1}{2}$ ounces	75 "
	Water.....	20 "	200 c.c.

For use, dilute ten parts with water to thirty-five parts.

For a single stock solution prepare as follows:—

No. 7. A.	Hydroquinone	50 grains	29 grammes.
	Metabisulphite of potash	80 "	46 "
	Water.....	4 ounces	1000 c.c.
B.	Carbonate of potash	840 grains	480 grammes.
	Water.....	4 ounces	1000 c.c.

Filter solution B, and then mix A and B.

For use, take half an ounce of this solution and add to five ounces of water.

FOR CHLORIDE PLATES.

Hydroquinone	2 grains	45 grammes.
Sulphite of soda	10 "	23 "
Carbonate of ammonia (or pot.)	10 "	23 "
Bromide of potassium.....	$\frac{1}{10}$ grain	0.3 "
Water.....	1 ounce	1000 c.c.

ILFORD

P.O.P.

THE LEADING GELATINO-CHLORIDE

POPULAR

PRINTING-OUT PAPER.

PRICES.

Exquisite and Unique. Used all over the World.

See Price List for Varieties.

ILFORD, LIMITED, ILFORD, LONDON, E.

DIPHENAL.

Diphenal, one of the recently introduced new developers, is chemically di-amido-oxydiphenyl, and it is the production of the Actien-Gesellschaft für Anilin-fabrikation, of Berlin. It is sent out in the form of a readily prepared solution of a brown colour, and the following are the directions for its use. For correctly exposed plates take:—

Diphenal.....	1 part.
Water	15 to 20 parts.

For over-exposed plates—

Diphenal	1 part.
Water	8 to 10 parts.

and for under-exposed plates take—

Diphenal	1 part.
Water	20 to 25 parts.

ACETONE PYRO-DEVELOPER.

Messrs. Lumière, who introduce acetone as a substitute for alkali in the pyro-developer, recommend the following composition as the best for a normal developer:—

Water	100 parts.
Sulphite of sodium (anhydrous)	5 "
Acetone solution	10 "
Pyrogallic acid	1 part.

ORTOL.**1. ORTOL SODA.**

A. Water, cold.....	10 ounces	1000	c. c.
Metabisulphite of potash ...	35 grains	7.5	grammes.
Ortol	70 "	15	"
B. Water	10 ounces	1000	c. c.
Carbonate of soda, crystals..	1½ "	120	grammes.
Sulphite of sodium, crystals...	1½ "	180	"
Bromide of potassium	5—10 grains	1—2	"
Hypo solution, 5 : 100	50 minims	10	c. c.

2. ORTOL POTASH.

A. Water, cold.....	10 ounces	1000	c. c.
Metabisulphite of potash.....	35 grains	7.5	grammes.
Ortol	70 "	15	"

ILFORD**KALONA**

THE NEW

ILFORD SELF-TONING

In two varieties, Glossy and Matt.

PAPER

POPULAR PRICES. Uniformity of Tone without any Trouble.
 Absolutely Simple and Reliable.

ILFORD, LIMITED, ILFORD, LONDON, E.

ater	10 ounces	1000	c. c.
Carbonate of potash.....	$\frac{1}{2}$ ounce	60	grammes.
Sulphite of sodium, crystals	$1\frac{3}{4}$ ounces	180	"
Bromide of potassium	5—10 grains	1—2	"
Hypo solution 5 : 100	50 minims	10	c. c.

In cold weather the bromide of potassium may be left out.

For quick development take 1 part A and 1 part B.

For slow and soft development take 1 part A, 1 part B, 1 part water.

ADUROL.

I.—SEPARATE DEVELOPER.

A. Adurol	10 grammes	85 grains.
Sulphite of sodium (cryst.).....	80 "	$1\frac{3}{4}$ ounces.
Water	500 c. c.	10 "
B. Carbonate of potash.....	60 grammes	$1\frac{1}{4}$ ounces.
Water	500 c. c.	10 "

For studio work and snap-shots take 1 part of A, 1 part of B.

For time exposures outdoor take 1 part of A, 1 part of B, 1 part of water.

II.—ONE-SOLUTION (CONCENTRATED) DEVELOPER.

Sulphite of sodium (cryst.).....	200 grammes	4 ounces.
Carbonate of potash	150 "	3 "
Water	500 c. c.	10 "

After all having been dissolved,

Adurol	25 grammes—	$\frac{1}{2}$ ounce.
--------------	-------------	----------------------

For studio work and snap-shots take 1 part with 3 parts of water.

For time exposures outdoor take 1 part with 5 parts of water.

KACHIN.

A SINGLE-SOLUTION DEVELOPER.

Water.....	20 ozs.	200 grammes.
Sulphite of soda	$\frac{1}{2}$ oz.	5 "
Carbonate of soda (crystals) ...	1 "	10 "
Kachin	96 grains	2 "

ILFORD

BROMIDE PAPER

POPULAR
PRICES.

SUPERB MATT SURFACE.
CONTACT OR ENLARGEMENT.

See Price List for Varieties.

ILFORD, LIMITED, ILFORD, LONDON, E.

A TWO-SOLUTION DEVELOPER.

A. Water.....	20	ozs.	250	grammes.
Sulphite of soda	2	"	25	"
Kachin	192	grains	5	"
B. Water	20	ozs.	250	grammes.
Caustic soda (pure sticks)	192	grains	5	"
Phosphate of soda	3 $\frac{3}{4}$	ozs.	47	"

For use, mix 1 part of A with 1 part of B and 1 part of water.

IMOGEN-SULPHITE.

This new developing agent is said to be a mixture of well-known developers, and it is simple in use and works cleanly and with great brilliance.

A. Imogen-sulphite.....	1	ounce	83.3	grammes.
Warm distilled water	11	ounces	1000	c. c.

B. Cold saturated solution, sodium carbonate.

For correctly exposed plates mix 2 parts of A with 1 part of B. For under-exposure of soft negatives mix 2 parts A, 1 part B, and 2 parts water. For over-exposure add from 5 to 50 drops of 10 per cent. solution of potassium bromide to every ounce of the developer. For very heavy contrasts use equal parts of A and B, and add to every ounce of developer 5 drops of 10 per cent. solution of potassium bromide.

DIOGEN.

Diogen is one of the latest developing agents, the composition of which is a secret. It gives a negative with good black colour and good gradation.

Sodium sulphite.....	4	ounces	100	grammes.
Diogen	1	ounce	24	"
Distilled water	10	ounces	250	c. c.
Potassium carbonate	5	"	125	grammes.

For correct exposure mix :—

Concentrated solution ...	4	drachms	14	c. c.
Water	17	"	60	"
Potassium bromide 10 p r cent. solution	2	drops	5	"

ILFORD

PLATONA PAPER

POPULAR

GENUINE PLATINUM PAPER.

PRICES.

In Two Varieties, Rough and Smooth.

ILFORD, LIMITED, ILFORD, LONDON, E.

For under-exposure:—

Concentrated solution ...	4 drachms	14 c. c.
Water	2-3 ounces	60-90 "

For over-exposure:—

Concentrated solution ...	4 drachms	14 c. c.
Water	1½-2 ounces	25-60 "
Potassium bromide 10 per cent. solution	2-85 m.	5-210 "

HYDROQUINONE, BR.

This developing agent is stated to be a chemical mixture of hydroquinone and a bromide, and whilst possessing all the advantages of hydroquinone, such as clear working, it does not give that harshness of contrast so characteristic of hydroquinone. It keeps well and does not stain.

A. Hydroquinone Br.....	½ ounce	10 grammes.
Sodium sulphite.....	4 ounces	80 "
Water	25 "	500 c. c.
B. Potassium carbonate.....	3 ounces	60 grammes.
Water	25 "	500 c. c.

For use mix 5 parts A, 5 parts B, and 4 parts water.

For over-exposure mix equal parts of A and B, and 20 to 30 drops of 10 per cent. bromide solution per ounce. For under-exposure mix equal parts A and B, and from 2 to 3 times the quantity of water.

SYNTHOL.

ONE SOLUTION.

Synthol.....	30 grains	8 grammes.
Sodium sulphite	150 "	40 "
Water	3½ ozs.	1000 c. c.

TWO SOLUTION.

1. Synthol.....	60 grains	12.5 grammes.
Sodium metabisulphite.....	360 "	75 "
Water	10 ozs.	1000 c. c.
2. Carbonate of soda	1 oz.	100 grammes.
Water	10 ozs.	1000 c. c.

For use mix in equal parts.

ILFORD

FILMS

FOR ALL WHO TRAVEL.

Easily worked in precisely the same way as

POPULAR
PRICES.

ILFORD PLATES.

See Price List for Varieties.

ILFORD, LIMITED, ILFORD, LONDON, E.

THE GELATINO-CHLORIDE PROCESS.

BARKER'S FORMULA FOR PRINTING-OUT EMULSION.

Gelatine (Nelson's No. 1 and Coignet's, equal parts).....	175 grains	80 grammes,
Chloride of ammonium	18 "	8 "
Rochelle salts	50 "	23 "
Nitrate of silver	75 "	34 "
Alcohol	4 drachms	100 c. c.
Water	5 ounces	1000 "

Heat to 100° Fahr. (38° C.), and allow to remain at this temperature after all is dissolved for ten minutes, after which proceed in the usual way.

VALENTA'S FORMULA.

A. Silver nitrate	480 grains	32 grammes.
Citric acid	120 "	8 "
Hot water	5½ ounces	160 c. c.
B. Gelatine	1440 grains	96 grammes.
Ammonium chloride	42 "	28 "
Water	21.3 ounces	700 "
C. Tartaric acid	42 grains	2.8 grammes.
Sodium bicarbonate	21 "	1.4 "
Alum.....	27 "	1.8 "
Water	5 ounces	140 c. c.

Allow the gelatine to swell in the water and melt by the aid of heat, and add the chloride. Mix B and C at 50° C., and in yellow light add A, heated to the same temperature, in small quantities, shaking thoroughly, and allow the emulsion to ripen for a short time at from 40° to 50° C, and then filter. For matt-surface papers the gelatine should be reduced to 754 grains or 80 grammes.

The above formula gives vigorous brilliant prints, but for soft negatives a harder printing emulsion is obtained by adding from 0.05 to 0.1 per cent. of calcium bichromate solution; this can be made by dissolving 480 grains or 25 grammes of pure chromic acid in 4 ounces or 100 c.c. of distilled water and adding sufficient pure chalk (calcium carbonate) to make the solution cloudy. The solution should then be filtered and the filter washed with distilled water up to 4 ounces or 100 c.c.

ILFORD CAMERA

FORTY EXPOSURES WITHOUT RELOADING.

CAN BE FULLY LOADED
with Forty Ilford Quarter-Plate Flat Films
IN HALF A MINUTE.

ILFORD, LIMITED, ILFORD, LONDON, E.

BEADLE'S FORMULA.

Nelson's gelatine	340 grains	112 grammes.
Alum	15.5 "	5 "
Water	6½ ounces	900 c.c.
Rochelle salt	15.5 grains	5 grammes.
Ammonium chloride	11 "	3.5 "
Heat to 50° C., and add:—		
Silver nitrate	115 grains	37.5 grammes.
Citric acid	62 "	20 "
Water	1 ounce	100 c.c.

TONING BATHS FOR GELATINO-CHLORIDE PAPERS.**SULPHOCYANIDE BATH.**

Chloride of gold	1 grain	0.25 grammes.
Ammonium or potassium sulphocyanide	12 grains	3.0 "
Water	8 ounces	1000 c.c.

It is necessary for this and all sulphocyanide baths to ripen; the best method of mixing is to boil the water and dissolve the gold in half and the sulphocyanide in the other half, and then pour the former into the latter, stirring all the time, and use when cool. If cold water is used, the mixture should be allowed to stand 12 hours.

CONCENTRATED SULPHOCYANIDE.**BUHLER'S FORMULA.**

Distilled water	1 ounce	280 c.c.
Chloride of gold	8.5 grains	5 grammes.
" " strontium	85 "	50 "

Heat the water to 98° C., add the gold and then the strontium, and add

Potassium sulphocyanide	25 grains	15 grammes.
Distilled water	7 drachms	250 c.c.

also heated to 98° C. When cool, filter, and wash the filter with distilled water so as to make the total bulk 2½ ounces or 700 c. c. For use mix 1 part of the stock solution with 19 parts of water.

THE FORMATE BATH.

Chloride of gold	1 grain	0.4 grammes.
Carbonate of soda	2 grains	0.8 "
Formate " "	15 "	60.0 "
Water	5 ounces	1000 c. c.

The prints must be immersed in a 10 % solution of salt and water before using this bath.

COMBINED TONING AND FIXING BATH.**VALENTA'S.**

Sodium hyposulphite	8 ounces	400 grammes.
Ammonium sulphocyanide	1 ounce	50 "
Nitrate of lead	175 grains	20 "
Alum	350 "	40 "
Water	20 ounces	1000 c. c.

Dissolve the hypo in the water, then add the sulphocyanide, then add the alum dissolved in a little water, and also the lead, and add to the hypo. Heat the mixture to 50° C. for ten minutes; allow to cool. For use take

Stock solution (as above)	100 parts.
Water	100 "
Chloride of gold (1% solution)	8 "

Wash the prints well first.

ALKALINE TONING AND FIXING BATH.

Chloride of gold	2 grains	0.2 grammes.
Nitrate of lead.....	10 "	1 "
Chalk.....	$\frac{1}{2}$ ounce	25 "
Hypo	4 ounces	200 "
Water	20 "	1000 c. c.

Shake the solution well and allow to settle, and use the clear portion.

PLATINUM BATHS FOR GELATINO-CHLORIDE PAPERS.

The prints must be immersed for five minutes in a 10 % solution of salt, and then rinsed prior to toning.

Potassium chloroplatinite	2 grains	2 grammes.
Dilute phosphoric acid	30 minims	80 c. c.
Distilled water	2 $\frac{1}{2}$ ounces	1000 "

HADDON'S FORMULA.

Platinum perchloride	3 grains	0.2 grammes.
Sodium formate	100 "	6.3 "
Formic acid	30 minims	1.2 c. c.
Water	35 ounces	1000 "

BLACK TONES ON GELATINO-CHLORIDE PRINTS.

VALENTA'S FORMULA.

Potassium chloroplatinite	2 $\frac{1}{2}$ —10 grains	5—1 gramme.
M-phenylendiamine	2 $\frac{1}{3}$ —10 "	5—1 "
Water	10 ounces	1000 c. c.

Wash the prints well first. Another method is to print deep and immerse the prints in

Salt	$\frac{1}{2}$ ounce	25 grammes.
Sodium bicarbonate	80 grains	5 "
Water	20 ounces	1000 c. c.

then wash well and tone in a borax gold bath to a purple red, then well wash and tone in the phosphoric platinum bath.

RED TONES ON GELATINO-CHLORIDE.

VALENTA'S FORMULA.

Uranium nitrate	1 grain	1 gramme.
Thiosinamine.....	5 grains	5 grammes.
Water	1 ounce	500 c. c.

The prints must be treated to a salt bath, well washed, and then toned.

IMPERIAL P.O.P.*Directions for Use.*

Hard negatives should be printed in strong light, delicate negatives only in the shade.

Prints should be rather darker than the finished picture is desired.

We specially recommend the following bath and mode of procedure for excellence and uniformity of result.

After printing, wash thoroughly for ten to fifteen minutes in running water before immersion in the Toning Solution.

In hot weather, if the surface of the prints become soft, immerse after washing, in an alum bath (alum 1 ounce, water 10 ounces), leave for ten minutes, wash again in running water for five to ten minutes and place in the following toning bath.

SULPHOCYANIDE TONING BATH.*Stock Gold Solution.*

Chloride of gold	15 grains	18 grammes.
Water (distilled or boiled) to...	15 drachms	1000 c. c.
No. 1. Sulphocyanide of ammonium	75 grains	8.5 grammes.
Water (boiled or distilled) to	20 ounces	1000 c. c.
No. 2. Stock gold solution.....	5 drachms	31 c. c.
Water to.....	20 ounces	1000 "

For use, take equal quantities of No. 1 and No. 2.

Add solution No. 2 slowly to solution No. 1, stirring all the time. Make up the solutions exactly as above, and follow out the instructions carefully.

The prints should tone in five to ten minutes.

When toning has been judged sufficient, wash for about five minutes and transfer to the following fixing bath:—

Hyposulphite of soda	3 ounces	150 grammes.
Water to.....	20 "	1000 c. c.

After fixation is complete (about ten minutes), wash thoroughly for one hour.

THE SYLVIO PAPER.

WELLINGTON & WARD, ELSTREE, HERTS.

The phosphate toning bath is recommended:—

Phosphate of soda	40 grains	6 grammes.
Gold chloride	2 "	0.3 "
Water	16 ounces	1000 c. c.

The bath should be used as soon as it is mixed.

VELOX DEVELOPERS.*Metol Quinol.*

Water	10 ounces	1000 c. c.
Metol	7 grains	1.6 grammes.
Sodium sulphite, crystals pure	$\frac{1}{2}$ ounce	50 "
Hydroquinone	30 grains	7 "
Sodium carbonate, desiccated*	200 "	45 "

Ten per cent. bromide of potassium solution, about 10 drops.

Amidol.

Water	4 ounces	1000 c. c.
Sodium sulphite, crystals pure...	200 grains	114 grammes.
Amidol.....	20 "	11 "
Ten per cent. bromide of potassium solution, about 5 drops.		

Metol.

Water	10 ounces	1000 c. c.
Metol	25 grains	5.7 grammes.
Sodium sulphite, crystals pure...	$\frac{1}{2}$ ounce	50 "
Sodium carbonate, desiccated*	120 grains	27 "
Ten per cent. bromide of potassium solution, about 20 drops.		

* If you use crystallised carbonate of sodium, take double this quantity.

Hypo Acid Fixing Bath.

Hypo.....	16 ounces	250 grammes.
Water	64 "	1000 c. c.

Then add the following hardening solution:—

Water	$14\frac{1}{2}$ ounces	1000 c. c.
Sodium sulphite, crystals.....	1 ounce	69 grammes.
Acetic acid, glacial acetic 51°...	$1\frac{1}{2}$ ounces	104 "
Powdered alum	1 ounce	69 "

PAGET PRIZE GELATINO-CHLORIDE PRINTING-OUT PAPER.

ORDINARY OR MATT SURFACE.

Printing should be somewhat darker than the finished print is required.

It should be borne in mind, when toning, that the finished image will be bluer and slightly stronger when dry than in the wet state.

Toning.—The following bath is strongly recommended in preference to any other:—

Sulphocyanide of ammonia ...	30 grains	4 grammes.
Gold chloride	$2\frac{1}{2}$ "	0.4 "
Water	16 ounces	1000 c. c.

Before immersion in this toning bath, the prints should be *very thoroughly washed* for at least fifteen minutes in running water. This is necessary to ensure even toning.

If the toning bath be found to tone too quickly, sulphite of soda equal in quantity to the gold used (*i. e.*, $2\frac{1}{2}$ grains for above quantity) may be added. This will make the bath work more slowly, without making any other difference. More or less may be used so as to regulate to speed desired. The sulphite should be kept in a stock solution and added to the bath immediately before use.

In hot weather, if necessary, the print may be soaked in alum (alum, 4 ounces; water, 20 ounces) for five minutes before toning in this bath. Another thorough washing is necessary between the alum and toning baths.

MARIONA PAPER (P.O.P.).

Directions.—Print as with albumenised papers, slightly darker than required for the finished picture, or for partial development, as instructions below.

Washing.—After printing, wash thoroughly in several changes of water from ten to fifteen minutes.

Toning.—This paper may be toned with any of the usual baths, but the following are recommended:—

PLATINUM TONING.—FOR SEPIA TONES.

Stock Solution.

- A. Potassium chloro-platinite, 15 grains (2.3 grammes) in 15 ounces (1000 c.c.) of water, to which have been previously added 5 minims ($\frac{1}{2}$ c.c.) of hydrochloric acid.
- B. Citric acid 160 grains 46 grammes.
 Chloride sodium..... 160 " 46 "
 Water 8 ounces 1000 c.c.

Take 2 ounces (60 c.c.) from A and 1 ounce (30 c.c.) from B, and make up to $1\frac{1}{2}$ pints (900 c.c.) with water. This is sufficient for toning two sheets.

GOLD TONING.—CARBONATE BATH.

- A. Stock solution of gold chloride, 15 grains tube in 15 ounces of water (2.3 grammes per litre).
- B. Sodium carbonate (common washing soda), 30 grains in 15 ounces of water. ($4\frac{1}{2}$ grammes per litre).

Take $2\frac{1}{2}$ ounces (75 c.c.) each of A and B, and make up to 1 pint (600 c.c.). This should tone about $2\frac{1}{2}$ sheets of paper.

GOLD TONING.—SULPHOCYANIDE BATH.

- A. Stock solution of gold chloride, 15 grains in 15 ounces of water (2.3 grammes per litre).
- B. Stock solution of ammonium sulphocyanide containing 15 grains to every ounce of water (35 grammes per litre).

For use, take one ounce (28 c. c.) each of A and B, and make up to 8 or 10 ounces (about 250 c.c.) with water, for each sheet of paper to be toned. The bath should be fresh every time.

Washing after Toning.—To be thoroughly washed in several changes of water, then placed in the fixing bath.

Fixing Bath.—Dissolve 3 ounces (150 grammes) of hypo in 1 pint of water (1000 c. c.). Keep the prints moving for at least 10 minutes.

Final Washing.—In running water, or several changes of water, for at least two hours.

Alum Bath.—In warm weather or hot climates it is advisable to use this bath before toning; strength about ten per cent., or chrome alum one per cent. for ten minutes, prints being again thoroughly washed before toning.

Partial Development.—This method will be found very convenient in dull weather, or even at night by magnesium or electric light. Print till the image is fairly visible, then immerse without washing in a ten per cent. solution of potassium bromide for four or five minutes. Then, after washing for a few minutes, place the print in the following developer mixed in equal proportions:—

A. Hydroquinone.....	80 grains	9 grammes.
Sodium sulphite	320 „	37 „
Make up with distilled water to	20 ounces	1000 c. c.
B. Sodium carbonate	400 grains	460 grammes.
Ammonium carbonate	400 „	460 „
Ammonium bromide	40 „	46 „
Make up with distilled water to	2 ounces	1000 c. c.

Continue the development until all but the faintest details are visible, then immediately wash the print thoroughly in running water to remove entirely the developer before placing it in the toning bath. All after-treatment will be the same as given above for printed-out prints.

THE COLLODIO-CHLORIDE PROCESS.

VALENTA'S FORMULA.

1. Strontium chloride	154 grains	10 grammes.
Lithium „	77 „	5 „
Water	500 minims	30 c. c.
Alcohol (absolute)	929 „	55 „
2. Silver nitrate.....	400 grains	20 grammes.
Water	500 minims	30 c. c.
Alcohol	1013 „	60 „
3. Citric acid	77 grains	5 grammes.
Alcohol	675 minims	40 c. c.
Glycerine	92 grains	6 grammes.

In a bottle capable of holding 1000 parts pour 350 parts of 3% collodion and add gradually 15 parts of No. 1, then in the dark room add almost drop by drop 60 parts of No. 2, shaking well after each addition; then add 50 parts of No. 3, and 50 parts of ether. This collodion is suitable for normal negatives, but more contrast can be obtained if 0.1 to 0.4 % calcium chromate solution is added. By reducing the amount of pyroxyline in the above formula the emulsion is more suitable for matt surface paper.

PAGET PRIZE COLLODIO-CHLORIDE PRINTING-OUT PAPER.

Printing should be somewhat darker than the finished print is required; about the same as for our P.O.P., not quite so dark as for albumen.

Keeping.—Both the unprinted pieces of paper and the untoned prints are best kept in a cool place, closely packed together, flat, and under slight pressure. If left loosely exposed to the air, the collodion film may dry and harden, becoming more liable to crack during the toning and subsequent operations. Toning should be done as soon after printing as convenient; the same day, or, at farthest, the next day if possible.

Washing.—Before immersion in the toning bath, the prints should be *very thoroughly washed* for at least five minutes in running water or in three or four changes. If running water from a tap be used, it should not be turned on too violently, as it may tear or injure the film.

Alum.—After washing, it is strongly recommended that the prints be placed in an alum bath (alum, 4 ounces; water, 1 pint) for five minutes, and then washed for a quarter of an hour before toning. The alum has no action on the collodion film, but hardens the prepared paper underneath, and effectually prevents any softening or peeling in the subsequent operations. If the alum be well washed out, toning proceeds even more easily than if alum had not been used.

Toning.—Any of the ordinary toning baths employed for albumen or gelatine may be used, but no bath gives such rich, brilliant tones, either warm or cold, as the sulphocyanide. If a little care be taken to ensure clean dishes and clean fingers, there is no bath more simple or certain. We strongly recommend this bath in preference to any other.

Sulphocyanide of ammonia.....	30 grains	4 grammes.
Gold chloride	2 "	0.3 "
Water	16 ounces	1000 c. c.

Tone to exactly the colour desired, judging the prints as they lie in the dish; but it should be borne in mind that the finished image will be slightly bluer and stronger when dry than in the wet state. Wash and fix in

Hyposulphite of soda.....	3 ounces	150 grammes.
Water	1 pint	1000 c. c.

If this bath be found to tone too quickly, sulphite of soda may be added at the rate of $\frac{1}{4}$ to $\frac{1}{2}$ grain for every grain of gold used (say 1 grain for above quantity). This will make the bath work more slowly, without making any other difference. More or less may be used, so as to regulate the speed desired. The sulphite should be kept in a stock solution, and added to the bath immediately before use.

Allow at least ten minutes for fixing. Wash thoroughly in running water for at least an hour. Do not on any account wash longer than two hours; never leave in the water all night.

The prints may be dampened off on blotting-paper and left to dry, or may be dried quickly in a moderate heat. They should *not* be left to dry *between* plotting-paper unless the latter is known to be pure. Impure blotting-paper makes spots and mottled marks on the prints.

THE ALBUMEN PROCESS.

PRESERVATIVES FOR SENSITISED ALBUMEN PAPER.

1.—Sensitise the paper in the usual bath, drain well, and when superficially dry float the back of the paper for twenty minutes on a solution of

Citric acid.....	1 ounce	33 grammes.
Water.....	30 ounces	1000 c.c.

Or,

2.—Sensitise as usual, drain well, and wash the paper in three or four changes of water, then float the back on a solution of

Nitrite of potassium.....	5 ounces	50 grammes.
Water	100 „	1000 c.c.

When dry, roll the paper up, coated side out, and wrap in blotting-paper soaked in the nitrite of potash solution, and dried.

TONING FORMULÆ FOR ALBUMEN PRINTS.

No. 1. Chloride of gold	1 grain	0.3 grammes.
Acetate of soda	30 grains	9 „
Water	8 ounces	1000 c. c.

This must not be used till one day after preparation. It keeps well and gives warm, rich tones.

No. 2. Chloride of gold	1 grain	0.3 grammes.
Bicarbonate of soda	4 grains	1 gramme.
Water.....	8 ounces	1000 c. c.

This is ready for immediate use after preparation, but it will not keep

No. 3. Chloride of gold	1 grain	0.3 grammes.
Phosphate of soda	20 grains	6 „
Water.....	8 ounces	1000 c. c.

This gives rich tones of a deep purple nature, but must be used soon after preparation.

No. 4. Gold solution	10 drachms	63 c. c.
Acetate of lime	20 grains	2 grammes.
Chloride of lime	1 grain	0.1 „
Tepid water	20 ounces	1000 c. c.

The 'gold solution' before mentioned is prepared by neutralising as much as is required of a one-grain solution of chloride of gold by

shaking it up with a little prepared chalk, then allowing it to settle, and filtering off the clear liquid. This toning bath improves by keeping. To use, add two ounces of it to eight ounces of tepid water, which will prove sufficient to tone a full-sized sheet of paper.

No. 5. Chloride of gold	15 grains	7 grammes.
Water.....	5 ounces	1000 c. c.

Neutralise with lime water, make up to fifteen ounces (3000 c. c.) with water, and add two drachms (54 grammes) of chloride of calcium. This stock solution will keep for a long time for use. Dilute one ounce with ten ounces of water.

TONING AND FIXING IN ONE BATH.

No. 6. Chloride of gold.....	1 grain	1 gramme.
Phosphate of soda.....	15 grains	17 grammes.
Sulphocyanide of ammonium	25 "	28 "
Hyposulphite of soda.....	240 "	275 "
Water	2 ounces	1000 c.c.

Dissolve the gold separately in a small quantity of water, and add to the other solution.

INGALL'S TONING FORMULA.

Hard water	(fluid) 20 ounces	1000 c.c.
Bi-carbonate of potash.....	20 grains	2 grammes.
Gold	2 "	0.2 "

FERRO-PRUSSATE OR BLUE PRINTING.

Ammonio-citrate of iron (brown)	60 grains	15 grammes.
Distilled water.....	$\frac{1}{2}$ ounce	60 c. c.
Potassium ferridcyanide	32 grains	8 grammes.
Distilled water.....	160 minims	40 c. c.
Oxalic acid	2 grains	0.5 grammes.
or Ammonio-citrate of iron (green)	50 grains	12.5 grammes.
Distilled water.....	$\frac{1}{4}$ ounce	30 c. c.
Potassium ferridcyanide	18 grains	4.5 grammes.
Distilled water.....	$\frac{1}{4}$ ounce	30 c. c.

Dissolve the salts separately, and mix just before use; filter if necessary. The latter formula gives a much more sensitive paper.

PELLET'S PROCESS.

This process may be described as the antithesis of the ferro-prussiate. Whereas in the latter the action of light gives a blue image, in Pellet's process those portions protected from light are blue.

HANGK'S FORMULA.

1. Gum arabic.....	96 grains	20 grammes.
Distilled water	1 ounce	100 c. c.
2. Ammonio-oxalate of iron.....	278 grains	60 grammes.
Distilled water	1 ounce	100 c. c.
3. Ferric chloride	$\frac{1}{2}$ "	50 grammes.
Distilled water	1 "	100 c. c.

For use mix No. 1, 35 parts : No. 2, 10 parts ; No. 3, 3 parts.

WATERHOUSE'S FORMULA.

1. Gum arabic.....	1 ounce	170 grammes.
Distilled water	4 ounces	650 c. c.
2. Tartaric acid	100 grains	40 grammes.
Distilled water	$\frac{3}{4}$ ounce	150 c. c.
3. Ferric chloride solution (Sp. Gr. 1.453)	5 drachms	120 c. c.

Mix the gum and acid and then add the iron solution, allow to stand 24 hours and add sufficient water to make the specific gravity 1.100.

After printing the paper should be floated on a 20% solution of ferrocyanide of potash.

SEPIA PAPER (LARUS'S FORMULA.)

1. Ammonio-citrate of iron (green)	84 grains	35 grammes.
Tartaric acid	9.6 "	4 "
Distilled water	1 ounce	200 c. c.
2. Gelatine	14.5 grains	6 grammes.
Distilled water	$\frac{1}{2}$ ounce	100 c. c.
3. Silver nitrate	24 grains	10 grammes.
Distilled water	$\frac{1}{2}$ ounce	100 c. c.

Mix Nos. 1 and 2 at 35° C. and gradually add with constant stirring No. 3. The solution should be applied warm to the paper. After printing immerse in water and then fix in 1.50 hypo solution. The action of light produces a brown image.

FERRO-GALLIC PROCESS.

(Sometimes known as the "ink" or Colas's process).

EDER'S FORMULA.

Ferric chloride	192 grains	10 grammes.
Ferric sulphate	96 "	5 "
Tartaric acid	172 "	9 "
Distilled water	4 ounces	100 c. c.
Dissolve and add		
Gelatine	96 grains	5 grammes.
Distilled water	2 ounces	50 c. c.

The gelatine must be dissolved before the iron salts are added.

NAKHARA'S FORMULA.

Gum arabic..... 288 grains 15 grammes.

Warm water..... 4½ ounces 110 c. c.

When dissolved add the following in the order given:—

Tartaric acid..... 38 grains 2 grammes.

Salt..... 172 „ 9 „

Ferric sulphate..... 192 „ 10 „

Ferric chloride..... 288 „ 15 „

The paper must be quickly dried in the dark.

DEVELOPER FOR ABOVE.

Oxalic acid..... 9½ grains 1 gramme.

Gallic acid..... 58 „ 6 grammes.

Water..... 20 ounces 1000 c. c.

URANIUM PRINTING.

A 1 to 6 solution of uranium nitrate may be merely painted over well sized paper and dried, but better results are obtained with the following:—

Uranium nitrate..... 80 grains 20 grammes.

Starch..... 20 „ 5 „

Acetic acid..... A few drops.

Water..... 1 ounce 120 c. c.

The starch should be boiled till quite clear, the acid added, and then the uranium. After printing the print should be rinsed in water, and floated on one or more of the following solutions:—

For red prints: 5% solution potassium ferridcyanide, acidulated with nitric acid. By treating the print thus obtained with a 4% solution of ferrous sulphate, acidulated with sulphuric acid, greenish-blue prints will result; if a 1.50 cobalt nitrate solution, bright green tones are obtained. By painting the red uranium print with 0.5% solution of chloride of gold violet tones are given, and if silver nitrate solution is used greyish black tones are given.

NEGATIVE INTENSIFIERS.

MONCKHOVEN'S.

1. A. Bromide of potassium..... 10 grains 23 grammes.

Bichloride of mercury..... 10 „ 23 „

Water..... 1 ounce 1000 c.c.

B. Pure cyanide of potassium... 10 grains 23 grammes.

Nitrate of silver..... 10 „ 23 „

Water..... 1 ounce 1000 c.c.

Place the negative in A till it is white, then rinse and transfer it to solution B. If the intensification has been carried too far, it may be reduced by treatment with a weak solution of hyposulphite of soda.

MERCURY AND AMMONIA.

Pour over the negative a saturated solution of mercuric chloride (bichloride of mercury); do not keep it on too long, unless the negative is very thin. Wash well, and immerse in bath of—

Water.....	10 ounces	1000 c.c.
Ammonia	10 minims	21 „

Leave the plate in this solution until the black colour goes quite through the film.

MERCURY WITH SODIUM SULPHITE.

Whiten the negative in the saturated solution of mercuric chloride, wash and blacken with a solution of sulphite of sodium 1 in 5.

IODIDE OF MERCURY.

Dissolve one drachm (14 grammes) of bichloride of mercury in seven ounces (700 c.c.) of water, and three drachms (42 grammes) of iodide of potassium in three ounces (300 c.c.) of water, and pour the iodide solution into the mercury till the red precipitate formed is completely dissolved.

For use, dilute with water, flow over the negative till the proper density is reached, and wash, when the deposit will turn yellow. Remove the yellow colour by flowing a five per cent. solution of hypo over the plate, and give it the final washing.

URANIUM.

Uranium nitrate.....	12 grains	7 grammes.
Potassium ferricyanide.....	15 „	9 „
Water	(fluid) 4 ounces	1000 c. c.

Before using this intensifier, great care is necessary that every trace of hypo is dissolved from the film, or red fog will result.

FERRICYANIDE OF LEAD.

The negative, after washing, is placed in a solution made as follows:—

Lead nitrate	20 grains	46 grammes.
Ferricyanide of potassium ...	30 „	69 „
Distilled water	1 ounce	1000 c. c.

After this it is again thoroughly washed until the drainings from the plate give a scarcely perceptible blue colour with ferrous-sulphate solution, and then ammonium sulphide (one part to ten parts of water) is poured over it.

BROMIDE OF COPPER.

A. Potassium bromide	180 grains	41 grammes.
Water	10 ounces	1000 c. c.
B. Cupric sulphate	240 grains	55 grammes.
Water	10 ounces	1000 c. c.

Mix the solutions, and, after standing a few hours, decant or filter out any potassium sulphate that may be precipitated. The solution will keep indefinitely, and may be used over and over again.

The *modus operandi* of intensification is the same as with the mercuric salt. The darkening or rendering sufficiently opaque of the deposit can

be done by a solution of ammonia in water—say, water, 10 ounces; stronger solution of ammonia, 1 drachm. The application of any old developer will bring about the same result.

LUMIÈRE'S MERCURIC IODIDE INTENSIFIER.

Composition of Normal Intensifier.

Water	100 parts.
Anhydrous sulphite of soda	10 "
Mercuric iodide	1 part.

Instructions for Use.—Dissolve the anhydrous sulphite of soda in the water, then add the mercuric iodide. After intensification in the above solution, the image is washed and then treated with an alkaline developer, such as is used for ordinary negative work.

NEGATIVE REDUCERS.

FARMER'S.

Saturated solution of ferridcyanide of potassium	1 part	100 c. c.
Hyposulphite of soda solution, 1 : 5 ...	10 parts	1000 "

BELITZSKI'S.

Potassium ferric oxalate	154 grains	10 grammes
Sodium sulphite	308 "	20 "
Water	7 ounces	200 c. c.

Dissolve and add

Oxalic acid (crystals) 38.45 grains or 2.5 to 3 grammes
and shake till the solution turns green, then decant from any undissolved crystals and add

Hyposulphite of soda	1½ ounces	50 grammes.
----------------------------	-----------	-------------

NAMIAS' POTASSIUM PERMANGANATE.

Potassium permanganate	8 grains	0.5 gramme.
Water	35 ounces	1000 c. c.

Bathe the negative in this, and if it turns brown immerse in a 1 per cent. solution of oxalic acid, and wash and dry.

CYANIDE REDUCING SOLUTION.

Cyanide of potassium.....	20 grains	5 grammes.
Iodide of potassium.....	10 "	2 "
Bichloride of mercury.....	10 "	2 "
Water.....	10 ounces	1000 c. c.

Reduction takes place slowly and is easy to control. After reducing the negative should be washed thoroughly.

Perchloride of iron.....	30 grains	3.4 grammes,
Citric acid	60 "	6.8 "
Water	1 pint	1000 c. c.

ORTHOCHROMATIC PROCESSES.

SENSITISERS FOR BLUE GREEN AND GREEN.

Chrysaniline (sat. sol. in hot alcohol) ...	10 minims	2 c. c.
Distilled water	1 ounce	100 "

This reduces the sensitiveness slightly to blue violet and ultra violet, but sensitises close up to the D line through the green and greenish blue. Time of bathing, 2 to 3 minutes.

Acridine yellow (sat. sol. in hot alcohol)	150-250 minims	30-50 c. c.
Distilled water	1 ounce	100 "

This gives greater sensitiveness, which extends from D $\frac{1}{2}$ E to ultra violet. Unfortunately the gelatine is rather deeply stained, and this can only be removed by alcohol.

Acridine orange N O (Leonhardt's) and benzoflavin II. (Oehler's) also sensitise well, the former up to D, the latter to E only.

SENSITISERS FOR GREENISH YELLOW AND YELLOW.

PRELIMINARY BATH.

Ammonia	10 minims	2 c. c.
Distilled water	1 ounce	100 "

Bathe the plates in this for two minutes, then immerse for the same time in

Erythrosine solution (1:500)	30 minims	6 c. c.
Ammonia	10 "	2 "
Water	1 ounce	100 "

and dry in the dark. Erythrosine is the best sensitiser for these colours. Naphthofluoresceine (Bayer) is also useful, and does not lower the blue sensitiveness so much as erythrosine; a deeper coloured yellow screen is therefore required in practice. A preliminary bath is used as for erythrosine, and the sensitising bath is

Naphthofluoresceine (1:500)	60 minims	12 c. c.
Ammonia	10 "	2 "
Distilled water	1 ounce	100 "

Bathe for two minutes and dry in the dark.

SENSITISERS FOR ORANGE AND RED.

DEBENHAM'S METHOD.

Bathe the plate in an alcoholic solution of Cyanine (1:2000) and dry in the dark; then bathe in distilled water for two or three minutes and expose while wet.

Much greater sensitiveness is given by Diazo black B H N, Benzoni-trol brown and Wool black 4 B and 6 B. With all these a deep green

filter must be used in the dark room. The method of using these dyes is as follows:—

For Diazo black and Benzonitrol brown.

PRELIMINARY BATH.

Ammonia	10 minims	2 c. c.
Alcohol	100 "	20 "
Water	1 ounce	100 "

Bathe the plates for two minutes, drain, and immerse for same time in

Dye solution (1:500).....	250 minims	50 c. c.
Alcohol	1000 "	200 "
Ammonia	50 "	10 "
Water	7 ounces	700 "

For wool black 4 B or 6 B.

PRELIMINARY BATH.

Ammonia	10 minims	2 c. c.
Water	1 ounce	100 "

Bathe for two minutes, drain, and immerse for same time in

Dye solution (1:500)	25 minims	5 c. c.
Ammonia	5 "	1 "
Water	1 ounce	100 "

HYPO ELIMINATORS, CLEARING SOLUTIONS, &c.

TO RESTORE FADED NEGATIVES.

Mr. W. E. Debenham recommends the following solution for the purpose of restoring printing force to negatives which have faded after mercurial intensification:—

Schlippe's salt	10 grains	23 grammes.
Water	1 ounce	1000 c. c.

Wet the film thoroughly by soaking in a dish of water, and immerse in the restoring solution until the desired effect is obtained.

TO REMOVE THE LAST TRACES OF HYPO FROM THE FILM.

HYDROXYL.

Peroxide of hydrogen (twenty vols.) ...	1 drachm	25 c. c.
Water	5 ounces	1000 "

After washing the negative well it is immersed for a couple of minutes in the solution and again rinsed in water, when the intensification with silver can be at once proceeded with.

ANOTHER.

Where peroxide of hydrogen is not obtainable the following may be used as a substitute, the solution containing that substance in combination with others :—

Barium dioxide	1 ounce	250 grammes.
Glacial acetic acid	1 "	250 "
Water	4 ounces	1000 c. c.

Reduce the barium dioxide to a fine powder and add it gradually to the acid and water, shaking until dissolved. A few minutes' immersion in this solution will effectually remove or destroy the last traces of hypo.

Ammonium persulphate	2½ grains	5 grammes.
Carbonate of soda	5 "	10 "
Water	1 ounce	1000 c. c.
or		
Potassium percarbonate	2½ grains	5 grammes.
Water	1 ounce	1000 c. c.

CLEARING SOLUTIONS.

Alum	2 ounces	200 grammes.
Citric acid	1 ounce	100 "
Water	10 ounces	1000 c. c.

Wash moderately after fixing, and immerse the negative in the above.

ANOTHER.

Saturated solution of alum	20 ounces	1000 c. c.
Hydrochloric acid (commercial)	1 ounce	50 "

Immerse the negative after fixing, having previously washed it for two or three minutes under the tap; wash well after removal from the alum and acid.

NEGATIVE VARNISHES, FORMULÆ FOR.

No. 1. Sandarac	4 ounces	143 grammes.
Alcohol	28 "	1000 c. c.
Oil of lavender	3 "	107 "

This is a good varnish for retouching upon, as a "tooth is easily obtained by rubbing."

No. 2. White hard varnish	15 ounces	150 c.c.
Methylated alcohol	20 to 30 "	200 to 300 c. c.

This will be found a good and cheap varnish if durability is not required, as it is easily rubbed up for retouching upon and easily cleaned off. Very suitable for enlarged negatives that are not to be retained.

Tough, hard, and durable:—

No. 3. Bleached shellac	1½ ounces	62 grammes.
Mastic	¼ ounce	13 "
Oil of turpentine	¼ "	13 c. c.
Sandarac	1½ ounces	62 grammes.
Alcohol	20 fluid ounces	1000 c. c.

No. 4. Sandarac	80 ounces	160 grammes.
Turpentine	36 "	72 c. c.
Oil of lavender.....	10 "	20 "
Alcohol	500 "	1000 "

This one may be rubbed down with powdered resin, and gives a splendid surface for retouching:—

No. 5. Sandarac	1 ounce	55 grammes.
Seed lac.....	1½ ounces	85 "
Castor oil	3 drachms	2 c. c.
Oil of lavender	1½ "	1 "
Alcohol	18 fluid ounces	1000 "

This varnish is somewhat dark in colour.

No. 6. Best orange shellac	2½ ounces	125 grammes.
Oil of lavender or oil of turpentine	¼ ounce	13 c. c.
Methylated alcohol.....	1 pint	1000 c. c.

Keep in a warm place until dissolved; then add a large teaspoonful of whiting or prepared chalk; shake, set aside to clear, and then decant. This is specially recommended for gelatine negatives.

No. 7. Celluloid	5 grains	10 grammes.
Amyl acetate	1 ounce	1000 c. c.

This may be flowed over or applied with a brush to the negative and requires no heat.

RETOUCHING VARNISH.

Sandarac	1 ounce	167 grammes.
Castor oil	80 grains	31 "
Alcohol	6 ounces	1000 c. c.

First dissolve the sandarac in the alcohol, and then add the oil.

In the above formulæ the proportions of alcohol must be taken as approximate, as different samples of resins vary, some giving more viscous solutions than others.

GROUND-GLASS VARNISH.

Sandarac	90 grains	103 grammes.
Mastic	20 "	23 "
Ether	2 ounces	1000 c. c.

Dissolve the resins in the ether and afterwards add

Benzole..... ½ to 1½ ounces (250 to 750 c. c.).

The proportion of the benzole added determines the nature of the matt obtained.

THE WET-COLLODION PROCESS.

PYROXYLINE (Hardwich).

Sulphuric acid 1·845.....(fluid)	18 ounces	600 c. c.
Nitric acid 1·457	6 "	200 "
Water	(fluid) 5 to 5½ "	167 to 182 c. c.
Cotton-wool	300 grains	23 grammes.

Temperature 150° Fahr. (60° C.) Time of immersion, 10 minutes

IODISED COLLODION (for Negatives).

For Acid Pyro Developer.

Ether, s.g. ·725.....	10 fluid ounces	1000 c. c.
Alcohol, s.g. ·805	4 "	400 "
Pyroxyline	120 grains	27 grammes.
Iodide of ammonium...	30 "	7 "
" cadmium	45 "	10 "
Alcohol ·830	4 fluid ounces	400 c. c.

BROMO-IODISED COLLODION (for Negatives).

Iron Developer.

Ether, s.g. ·725	10 fluid ounces	1000 c. c.
Alcohol, s.g. ·805	5 "	500 "
Pyroxyline	120 grains	27 grammes.
Iodide of Ammonium...	40 "	9 "
" cadmium	40 "	9 "
Bromide of "	20 "	4·5 "
Alcohol ·830	5 fluid ounces	500 c. c.

BROMO-IODISED COLLODION (for Positives or Ferrotypes).

Ether, s.g. ·725.....	10 fluid ounces	1000 c. c.
Alcohol, s.g. ·805.....	5 "	500 "
Pyroxyline.....	100 grains	23 grammes.
Iodide of cadmium	50 "	11½ "
Bromide of ammonium ...	25 "	5·7 "
Alcohol ·830	5 fluid ounces	500 c. c.

Note.—The iodides should be dissolved in the weaker spirit and the pyroxyline in the ether and stronger spirit, and the two solutions mixed.

THE NITRATE BATH (for Negatives).

Nitrate of silver (recrystallised)	6 ounces	75 grammes.
Distilled water	80 fluid ounces	1000 c.c.
Nitric acid (pure)	8 minims	0.2 "

Saturate with iodide of silver, then filter.

This is best done by coating a plate with collodion and leaving it in the bath for some hours.

(For Positives or Ferrotypes).

Nitrate of silver (recrystallised)	5½ ounces	70 grammes.
Distilled water	80 fluid ounces	1000 c.c.
Nitric acid (pure)	½ drachm	0.8 "

Saturate with iodide of silver and filter as above.

EDER'S FORMULA.

(For half-tone screen work).

Cadmium iodide	108 grains	7 grammes.
Ammonium iodide	50 "	3.2 "
" bromide	18½ "	1.2 "
Alcohol	6 ounces	175 c. c.
Raw Collodion 2%	18 "	525 "

Or equal parts of above and

Strontium iodide	154 grains	10 grammes.
Cadmium bromide	68 "	1.8 "
Alcohol	7 ounces	200 c. c.
Collodion 2%	21 "	600 "

The developer specially recommended for above is:—

Sulphate of iron	288 grains	30 grammes.
" " copper	192 "	16 "
Glacial acetic acid	1 ounce	50 c. c.
Alcohol	½ "	30 "
Water	20 ounces	1000 "

DEVELOPER.

FOR NEGATIVES.

No. 1. Ferrous sulphate	½ ounce	50 grammes.
Glacial acetic acid	½ "	50 c.c.
Alcohol	½ "	50 "
Water	10 ounces	1000 "
No. 2. Ammonio-sulphate of iron	75 grains	43 grammes
Glacial acetic acid	75 "	43 "
Sulphate of copper	7 "	4 "
Water	4 ounces	1000 c.c.
Alcohol	½ ounce	60 "

FOR COLLODION POSITIVES OR PERROTYPES.

Ferrous sulphate	150 grains	34 grammes.
Glacial acetic acid	$\frac{1}{2}$ ounce	50 c. c.
Nitric acid.....	5 minims	1 "
Alcohol	$\frac{1}{2}$ ounce	50 "
Water.....	10 ounces	1000 "

Note.—By increasing the proportion of nitric acid and decreasing that of the acetic, the image will be more metallic in appearance.

NITRATE OF IRON DEVELOPER FOR POSITIVES.

Ferrous sulphate.....	$1\frac{1}{2}$ ounces	75 grammes.
Nitrate of baryta	1 ounce	50 "
Water	1 pint	1000 c. c.
Alcohol.....	1 ounce	50 "
Nitric acid	40 drops	4 "

The insoluble sulphate of baryta which is formed must be filtered out.

FIXING SOLUTION FOR POSITIVES.

Cyanide of potassium	$\frac{1}{2}$ ounce	25 to 30 grammes.
Water	15 to 20 ounces	1000 c. c.

FOR COLLODION TRANSFERS.

Pyrogallie acid	5 grains	11 grammes.
Citric acid	3 "	7 "
Acetic acid	20 minims	41 c. c.
Water	1 ounce	1000 "
Alcohol	20 minims	41 "

PYROXYLINE FOR DRY-COLLODION PROCESSES.

FOR COLLODIO-BROMIDE OR UNWASHED EMULSION.

Nitric acid, s.g. 1.45.....	2 fluid ounces	285 c. c.
Sulphuric acid, s.g. 1.845 ...	4 "	570 "
Water.....	1 fluid ounce	145 "
Cotton (cleaned and carded)	100 grains	33 grammes.
Temperature.....	150° Fahr.	65° C.
Time of immersion	10 minutes.	

FOR WASHED EMULSION.

Nitric acid, s.g. 1.45	2 fluid ounces	400 c. c.
Sulphuric acid, s.g. 1.845 ...	3 "	600 "
White blotting-paper	145 grains	66 grammes.
Temperature	100° Fahr.	38° C
Time of immersion	30 minutes.	

THE COLLODIO-BROMIDE PROCESS.

COLLODIO-BROMIDE EMULSION.

Ether, s.g. .720.....	5 fluid ounces	620 c. c.
Alcohol, s.g. .820	3 "	380 "
Pyroxyline.....	50 grains	14.3 grammes.
Bromide of cadmium and ammonium	80 "	23 "
or Bromide of zinc	76 "	21.5 "

Sensitise by adding to each ounce fifteen grains of nitrate of silver dissolved in a few drops of water and one drachm of boiling alcohol. This is suitable for slow landscape work or for transparencies.

WASHED EMULSION (for Landscapes).

No. 1.

Ether, s.g. .720.....	4 fluid ounces	590 c. c.
Alcohol, s.g. .820	2 $\frac{3}{4}$ "	410 "
Pyroxyline	40 grains	13.5 grammes.
Castile soap (dissolved in alcohol)...	30 "	10 "
Bromide of ammonium and cadmium	84 "	27.3 "

Sensitise with one hundred grains of nitrate of silver dissolved in one ounce of boiling alcohol; and, after standing ten days, add a further twenty grains of silver dissolved as before in two drachms of alcohol.

No. 2 (rapid).

Ether, s.g. .720.....	4 fluid ounces	615 c.c.
Alcohol, s.g. .820.....	2 $\frac{1}{2}$ "	215 "
Pyroxyline	40 grains	14 grammes.
Castile soap	30 "	10.5 "
Bromide of ammonium and cadmium	56 "	20 "

Sensitise with 125 grains of nitrate of silver, dissolved, as before, in one ounce of alcohol with the aid of heat. In twelve hours' time add thirty grains more of the double bromide of ammonium and cadmium dissolved in half an ounce of alcohol.

FOR WASHED EMULSION (for Transparencies).

Ether, s.g. .720.....	5 fluid ounces	620 c.c.
Alcohol, s.g. .820.....	3 "	380 "
Pyroxyline or papyroxyline	60 grains	17 grammes.
Bromide of cadmium and ammonium	100 "	29 "
or Bromide of zinc	96 "	27.5 "
Hydrochloric acid, s.g. 1.2.....	8 minims	2 c.c.

Sensitise with twenty grains of nitrate of silver to each ounce (4.3 grammes to each 100 c.c.), dissolved in a minimum of water with two drachms (13 c.c.) of boiling alcohol. Allow to stand for two or three days.

N. B.—In the three last formulæ, the emulsion, after being allowed to ripen for the time stated, should be poured into a dish and allowed to

become thoroughly dry. The mass of dry emulsion is then washed, to remove all the soluble salts, and is then again dried and redissolved in equal parts of ether and alcohol, at the rate of from twenty to twenty-four grains to the ounce of solvents.

DEVELOPING SOLUTIONS FOR COLLODION EMULSION.

SOLUTION A.

Pyrogalllic acid.....	96 grains	22 grammes.
Alcohol	1 fluid ounce	100 c.c.

SOLUTION B.

Bromide of potassium ...	10 grains	23 grammes.
Water	1 fluid ounce	1000 c.c.

SOLUTION C.

Liquor ammoniæ, s.g. '880	1 fluid drachm	60 c.c.
Water	15 fluid drachms	940 „

OR D.

Carbonate of ammonium	120 grains	275 grammes.
Water	1 fluid ounce	1000 c. c.

For each drachm (100 c. c.) of developer take, for a normal exposure five minims ($8\frac{1}{2}$ c. c.) of A, one or two minims (about 3 c. c.) of B, and the same of C; or, if D be used, add the above quantities of A, B, and C, to one drachm (100 c. c.) of D. When the details of the image are out, add double the quantities of B and C.

WELLINGTON'S COLLODIO-BROMIDE EMULSION FORMULÆ.

Pyroxyline	30 grains	23 grammes.
Ether	12 drachms	500 c. c.
Alcohol	12 „	500 „

To bromise, add 30 grains (23 grammes) bromide ammonium dissolved in 45 minims (31 c. c.) water, to which 4 drachms (170 c. c.) of alcohol are afterwards added; 50 grains (33 grammes) of nitrate of silver dissolved in a drachm ($4\frac{1}{2}$ c. c.) of water are then added. After washing and drying, the pellicle is dissolved in $1\frac{3}{4}$ ounces (580 c. c.) of ether and the same of alcohol.

DEVELOPER.

No. 1. Pyrogalllic acid	1 ounce	56 grammes.
Sulphite of soda	4 ounces	224 „
Water	18 „	1000 c. c.
No. 2. Potassium carbonate	3 ounces	166 grammes.
Sulphite of soda	2 „	112 „
Water	18 „	1000 c. c.
No. 3. Bromide ammonium.....	1 ounce	100 grammes.
Water	10 ounces	1000 c. c.

Use equal parts of each without dilution,

NESBIT'S FORMULÆ.

Pyroxyline	60 grains	27.5 grammes.
Methylated alcohol	2 $\frac{3}{4}$ ounces	550 c. c.
Ether	2 $\frac{1}{4}$ "	450 "
Bromide ammonium (in water 100 minims, 200 c.c.)	63 grains	28 grammes.
Alcohol	1 ounce	200 c. c.
Nitrate of silver	100 grains	46 grammes.
Water	60 minims	25 c. c.

After washing and drying, redissolve in alcohol 4 ounces, ether 4 ounces (800 c.c.).

INTENSIFYING SOLUTIONS FOR COLLODION EMULSION.

Nitrate of silver	60 grains	68 grammes.
Citric acid	30 "	31 "
Nitric acid	30 minims	31 c. c.
Water	2 ounces	1000 "

To each drachm of a three-grain solution of pyrogallie acid add two or three minims of the above, and apply until sufficient density is attained.

MISCELLANEOUS FORMULÆ.

THE "DUSTING-ON" PROCESS.

- No. 1. Saturated solution of bichromate
of ammonium..... 5 drachms or grammes.
Honey..... 3 " " "
Albumen..... 3 " " "
Distilled water..... 20 to 30 " " c. c.
- No. 2. Dextrine..... $\frac{1}{2}$ ounce or 5 grammes.
Grape sugar..... $\frac{1}{2}$ " " "
Bichromate..... $\frac{1}{2}$ " " "
Water..... $\frac{1}{2}$ pint = 10 ounces or 100 c. c.
- No. 3. Gum arabic..... 6 parts or grammes.
Bichromate of potash..... 2.5 " " "
Grape sugar..... 4 " " "
Water..... 72 " " c. c.

SILVERING MIRRORS (MARTIN'S METHOD).

(In employing the following formula, it should be well understood that the glass plate to be silvered must be scrupulously clean.)

- A. Nitrate of silver 175 grains 40 grammes,
Distilled water 10 ounces 1000 c. c.

B. Nitrate of ammonium...	262 grains	60 grammes.
Distilled water	10 ounces	1000 c. c.
C. <i>Pure</i> caustic potash	1 ounce	100 grammes.
Distilled water	10 ounces	1000 „
D. Pure sugar candy	$\frac{1}{2}$ ounce (avoird.)	100 grammes.
Distilled water	5 ounces	1000 c. c.

Dissolve and add—

Tartaric acid..... 50 grains 23 grammes.

Boil in a flask for ten minutes, and when cool add—

Alcohol

Distilled water *quant. suff.* to make up to 10 ounces or 2000 c. c.

For use take equal parts of A and B. Mix together also equal parts of C and D, and mix in another measure. Then mix both these mixtures together in the silvering vessel, and suspend the mirror face downward in the solution.

INK FOR RUBBER STAMPS.

Aniline red (violet)	90 grains	206 grammes.
Boiling distilled water	1 ounce	1000 c. c.
Glycerine	half a teaspoonful	60 „
Treacle	half as much as glycerine	30 „

TO RECOVER FOGGED PLATES.

Make a solution as follows:—

Chromic acid	30 grains	7 grammes.
Bromide of potassium.....	60 „	14 „
Water	10 ounces	1000 c. c.

And immerse the plates for five minutes. Afterwards wash very thoroughly, and rear up to dry.

Or, instead of the above, make the following:—

Bichromate of potash	1 ounce	100 grammes.
Hydrobromic acid	2 drachms	25 „
Water	10 ounces	1000 c. c.

If hydrobromic cannot be obtained, use hydrochloric acid or a soluble bromide; in the last case a few drops of sulphuric acid being added to the solution. Use as before.

SOLUTION FOR MOUNTING PRINTS WITHOUT THEIR COCKLING.

Nelson's No. 1 photo. gelatine	4 ounces	182 grammes.
Water	16 „	728 c. c.
Glycerine	1 ounce	45 „
Methylated alcohol	5 ounces	227 „

Dissolve the gelatine in the water, then add the glycerine, and lastly the spirit,

ENCAUSTIC PASTE.

Pure wax	500 parts	grammes.
Gum elemi	10	" "
Benzole	200	" c.c.
Essence of lavender	300	" "
Oil of spike	15	" "

BACKING SHEETS FOR DRY PLATES.

Gelatine	1 part	50 grammes.
Water	2 parts	100 c.c.
Glycerine	1 part	50 "
Indian ink	A small addition.	

Make a paste, and coat strong paper; place the prepared material, face downwards, on waxed glass to set. Press to back of plate before putting into dark slide.

SENSITISING SOLUTION FOR CARBON TISSUE.

Bichromate of potash	1 ounce	350 to 500 grammes.
Water	20 to 30 ounces	1000 c.c.
Liquor ammoniæ	20 minims	1·5 to 2 c.c.

A strong solution should be used for hard negatives and a more dilute one for soft negatives.

WAXING SOLUTION.

FOR CARBON PRINTS, OR FOR REMOVING COLLODION FILMS.

No. 1. Beeswax	20 grains	10 grammes.
Benzole rect. No. 1	4 ounces	1000 c.c.

FOR FLEXIBLE SUPPORTS (Autotype).

No. 2. Yellow resin	3 drachms	41 grammes.
Yellow beeswax	1 drachm	14 "
Rectified spirits of turpentine	10 ounces	1000 c.c.

ALBUMEN PROCESS FOR TRANSPARENCIES.*Iodised Albumen.*

Albumen	10 ounces	1000 c.c.
Liquor ammoniæ	$\frac{1}{2}$ drachm	6 "
Iodide of ammonium	50 grains	11 grammes.
Bromide of ammonium	10	2 "

Silver Bath.

Water	10 ounces	1000 c.c.
Nitrate silver	1 ounce	100 grammes.
Glacial acetic acid	1 "	100 "

Coat the glass with old iodised collodion and when it has set wash under the tap, drain, and coat with the albumen. When dry, sensitise for 1 minute, wash, and again dry.

Developer.

Pyrogallic acid.....	30 grains	7 grammes.
Citric acid.....	20 „	4.5 „
Water.....	10 ounces	1000 c. c.

Use warm (120° Fahr. or 40° C.) and add 2 or 3 drops of a solution of 20-grain per ounce nitrate of silver (5 per cent.) at the time of using. Fix in a solution of Hyposulphite of soda 4 ounces to the pint (20 per cent.). Tone with gold if the colour is too brown.

LUBRICANT FOR BURNISHING PRINTS.

Castile soap.....	20 grains	4 grammes.
Alcohol.....	10 ounces	1000 c. c.

BACKING FOR DRY PLATES TO PREVENT HALATION (TEAPE'S).

Gum solution (ordinary office gum).....	1 ounce or part.
Caramel.....	1 „ „
Burnt sienna, ground in water.....	2 ounces or parts.
Mix and add alcohol.....	2 „ „

COLOUR FOR APPLYING TO BRIGHT MACHINERY PRIOR TO PHOTOGRAPHING IT.

Mix white lead with turpentine to the consistence of thin cream, with sufficient lamp-black to form a light slate colour, and then add one-sixth the bulk of japanners' gold size. Paint the machinery over with this. After photograph has been taken, the colour can be quickly removed with a pledget of 'cotton waste' moistened with turpentine or benzoline.

RETOUCHING MEDIUM.

Pale resin.....	1 ounce or parts.
Oil of turpentine.....	1 „ „ „
Oil of lavender.....	2 ounces „ „

TO PREVENT BLISTERS IN ALBUMEN PRINTS.

Before wetting the prints immerse them in methylated spirit, then wash and tone as usual.

STRIPPING THE FILMS FROM GELATINE NEGATIVES.

Soak the negative for ten minutes in a ten per cent. solution of formaline, then rinse and immerse in

Water.....	1 ounce	500 c. c.
Methylated spirit.....	1 „	500 „
Glycerine.....	20 m.	20 „
Hydrofluoric acid.....	40 „	40 „

till the film lifts at the corners, then strip from the glass and wash. This solution does not cause the film to enlarge.

PRINTING ON PLAIN PAPER.

Prepare the plain paper with

Ammonium chloride.....	60 to 80 grains	14 to 18 grammes.
Sodium citrate	100 "	23 "
Sodium chloride	20 to 30 "	5 to 7 "
Gelatine	10 "	2 "
Distilled water	10 ounces	1000 c. c.
or, Ammonium chloride	100 grains	23 grammes.
Gelatine	10 "	2 "
Water	10 ounces	1000 c. c.

The gelatine is first swelled in cold water and then dissolved in hot water, and the remaining components of the formula are added. The solution is filtered, and, when still warm, the paper floated upon it for three minutes.

The salted paper is sensitised upon a neutral 45-grain silver bath.

PLATINUM TONING BATH FOR PLAIN SILVER PRINTS.

Chloroplatinite of potassium	1 gramme.
Water.....	1 litre.
Nitric acid	5 to 10 drops.

INVISIBLE INK.

Chloride of cobalt.....	50 grains	11.4 grammes.
Distilled water	1 fluid ounce	1000 c. c.
Glycerine	10 minims	21 "

Dissolve the chloride of cobalt in the distilled water, and add the glycerine.

Writing executed with this ink is invisible on paper, but, on warming, the writing turns blue. On exposure to damp air it becomes invisible again.

SOLUTION FOR MAKING PAPER ADHERE TO METAL.

Tragacanth	30 grammes.
Gum arabic	120 "
Water.....	500 c. c.

REDUCER FOR P.O.P. PRINTS.

Potassium Iodide	5 grains	5 grammes.
Sat. sol. of hypo.....	1 ounce	500 c. c.
or, Uranium nitrate.....	5 grains	5 grammes.
Water	2 ounces	1000 c. c.

FILM VARNISH.

Borax	300 grains	30 grammes.
Glycerine	300 m.	30 c. c.
Shellac	600 grains	60 grammes.
Water	20 ounces	1000 c. c.

Boil together for about half an hour, then add—

Methylated spirit.....	5 ounces	250 c. c.
------------------------	----------	-----------

and filter.

DEXTRINE MOUNTANT.

White dextrine	90 grains	90 grammes.
White sugar	15 "	15 "
Carbolic acid.....	2 m.	2 c. c.
Boiling water.....	$\frac{1}{4}$ ounce	1000 "

SEPIA TONES ON PLATINUM PAPER.

Prepare the following solutions:—

1. Potassium oxalate	4 ounces	250 grammes.
Distilled water.....	16 "	1000 c. c.
2. Cupric chloride.....	124 grains	61 grammes.
Distilled water.....	8 ounces	1000 c. c.
3. Mercuric chloride.....	1 ounce	62 grammes.
Distilled water	16 ounces	1000 c. c.
4. Lead acetate.....	32 grains	16 grammes.
Distilled water	4 ounces	1000 c. c.

Mix 12 parts of No. 1 with 4 parts No. 2, then add 4 parts No. 3 and 1 part No. 4, and heat till the precipitate first formed is redissolved. The solution should be heated to 80° C. and the prints developed in it in the usual way and treated to the usual acid clearing baths, and then immersed in strong ammonia 1 part, water 128 parts, for five minutes and then washed and dried.

WATERPROOFING SOLUTION FOR WOOD.

Asphalt	4 ounces	400 grammes.
Pure rubber	30 grains	6 "
Mineral naphtha	10 ounces	1000 c. c.

Apply with a stiff brush and give three successive coats, allowing to dry between each. The vapour of this is very inflammable.

TO BLACKEN ALUMINIUM.

Clean the metal thoroughly with fine emery powder, wash well and immerse in

Ferrous sulphate	1 ounce	84 grammes.
White arsenic	1 "	84 "
Hydrochloric acid.....	12 ounces	1000 c. c.

Dissolve and add

Water	12 ounces	1000 c. c.
-------------	-----------	------------

When the colour is deep enough dry off with fine sawdust and lacquer.

DEAD BLACK FOR WOOD.

Borax	30	grains	7.5	grammes.
Glycerine	30	m.	7.5	"
Shellac	60	grains	15	"
Water	8	ounces	1000	c. c.

Boil till dissolved and add

Nigrosinē W.S.	60	grains	15	grammes.
---------------------	----	--------	----	----------

or paint the wood first with

Cupric chloride	75	grains	75	grammes.
Potassium bichromate ...	75	"	75	"
Water	2½	ounces	1000	c. c.

and as soon as the surface dries apply

Aniline hydrochlorate ...	150	grains	150	grammes.
Water	2½	ounces	1000	c. c.

and wipe off any yellow powder that forms, and repeat the process till black enough, and then rub over with boiled linseed oil.

ACID FIXING BATHS.

(For negatives and bromide paper).

Sodium sulphite solution (1.4).....	2½	ounces	62.5	c. c.
Tartaric acid solution (1.2).....	¾	ounce	18	"

Mix and add to

Hyposulphite of soda solution (1.5)	40	ounces	1000	c. c.
or, Hyposulphite of soda	4	"	200	grammes.
Bisulphite of soda.....	1	ounce	50	"
Water	20	ounces	1000	c. c.

SAFE DARK ROOM SCREENS

VOGEL'S FORMULA.

1. Aurantia	5	grains	1	gramme.
Water	1	ounce	100	c. c.

If necessary, add a few drops of liq. ammon. fort. to clear solution.

2. Gelatine	96	grains	20	grammes.
Water.....	1	ounce	100	c. c.

Dissolve by the aid of heat.

3. Rhodamine	40	grains	8	grammes.
Water	2½	ounces	250	c. c.

Mix Nos. 1 and 2 in equal quantities and coat glass with the mixture, all wing 500 minims or 30 c. c. to every 56 sq. inches or 360 sq. cm. Mix 3 parts of No. 3 with 2½ parts of No. 2, and coat another sheet of glass with the mixture, in the same proportion to area. The two when bound together will make a safe light filter.

DEVELOPING FORMULÆ, ETC., OF THE PRINCIPAL PLATE AND PAPER MAKERS.

AUSTIN EDWARDS'S FORMULÆ.

PYRO.

- No. 1. Pyrogallic acid 1 ounce or 12·5 grammes.
 Nitric acid 20 drops „ 0·5 c.c.
 Water 8 ounces „ 1000 „
- No. 2. Sulphite of soda 2½ ounces or 125 grammes.
 Carbonate of soda (crystals)... 2¼ „ „ 113 „
 Potassium bromide..... 10 grains „ 25 „
 Water 20 ounces „ 1000 c.c.

Add the acid to the water before dissolving the pyro.

For correct exposure, use equal parts of Nos. 1 and 2.

For known over-exposure use 2 parts No. 1 and 1 part No. 2.

HYDROQUINONE.

- No. 1. Water 20 ounces or 1000 c.c.
 Hydroquinone 120 grains „ 14 grammes.
 Sulphite soda 2 ounces „ 100 „
- No. 2. Water 20 ounces or 1000 c.c.
 Carbonate of potash 4 „ „ 200 grammes.
 Bromide potassium 30 grains „ 3·5 „

Dissolve the hydroquinone in the water before adding the sulphite
 For use take equal parts of each.

HYDROQUINONE DEVELOPER FOR LANTERN PLATES.

(For Black Tones).

- Distilled water 20 ounces or 1000 c.c.
 Hydroquinone 60 grains „ 7 grammes.
 Sulphite soda..... 2 ounces „ 100 „
 Carbonate soda (crystals) ... 6 „ „ 300 „
 Bromide potassium 40 grains „ 4·6 „

Dissolve the hydroquinone in the water and add the other ingredients
 in the order named.

Time of development, if exposed correctly, about 2 minutes. This
 developer may be used several times.

PYRO DEVELOPER.

(For Warm Tones).

- No. 1. Water 20 ounces or 1000 c.c.
 Nitric acid 20 drops „ 2 „
 Sulphite soda 4 ounces „ 200 grammes.
 Pyrogallic acid 1 ounce „ 50 „

No. 2. Water	20 ounces or 1000 c. c.
Bromide ammonium (not potass.)	3 " " 150 grammes.
Liq. ammonia '890	1 ounce " 50 "

Add the acid to the water, and the other ingredients in the order named.

For use, take 1 part each of Nos. 1 and 2, and dilute with equal quantities of water. For still warmer tones, add 1 part more water, or again double the exposure and add one-fourth more No. 2. This developer may be used several times.

CADETT & NEALL'S FORMULÆ.

PYRO AMMONIA (1).

Stock Solution.

Pyrogallic acid	(avoirdupois) 1 ounce or 136 grammes.
Ammonium bromide.....	" " " 68 "
Potass. metabisulphite...	" " " 136 "

Distilled water to make altogether, 7 ounces, 3 drachms fluid, or 1000 c. c.

Dissolve the metabisulphite and bromide in part of the distilled water, before adding the pyrogallic acid.

A. Stock solution	1 ounce	or 50 c. c.
Distilled water to make altogether	20 ounces=1 pint	" 1000 "
B. Ammonia ('890)	2½ drachms	" 16 "
Distilled water to make altogether	20 ounces=1 pint	" 1000 "

Mix equal parts of A and B to make developer.

PYRO AMMONIA (2).

Stock Solution.

Pyrogallic acid	(avoirdupois) 1 ounce or 136 grammes.
Ammonium bromide...	" " " 136 "
Sulphurous or sulphuric or citric acid,	1 drachm " 17 c.c. or grammes.

Distilled water to make altogether, 7 ounces, 3 drachms, fluid or 1000 c. c.

Mix the acid with part of the distilled water before adding the bromide and pyrogallic acid.

A. Stock solution	1 ounce	or 50 c. c.
Distilled water to make altogether	20 ounces=1 pint	" 1000 "
B. Liq. ammoniæ ('890)	2½ drachms	" 16 "
Distilled water to make altogether	20 ounces=1 pint	" 1000 "

Mix equal parts of A and B to make developer.

FERROUS OXALATE.

A. Ferrous sulphate.....	(avoirdupois) 5 ounces or 250 grammes.
Sulphuric acid.....	10 minims " 1 c. c.
Distilled water to make altogether	20 ounces or 1000 "
B. Neutral potass. oxalate	(avoirdupois) 10 ounces or 250 grammes.
Distilled water to make altogether (fluid)	40 " " 1000 c. c

Dissolve the potass. oxalate in about three-quarters of the distilled water, made warm, and make up to bulk after the salt is dissolved.

The ferrous sulphate should be powdered just before solution in about three-quarters of the distilled water to which the sulphuric acid has been previously added. Make up to bulk after solution.

To make developer, add one part of A to four of B. For over-exposure, add a few drops to the mixed developer of a ten per cent. solution of potassium bromide.

PYRO SODA.

Stock Solution.

Pyrogallic acid	(avoirdupois)	1 ounce	or	100 grammes.
{ Potassium metabisulphite		40 grains	"	9
{ or sulphuric acid	(fluid)	1 drachm	"	12 c. c.
Distilled water to make altogether	"	10 ounces	"	1000 "
A. Stock solution	(fluid)	3 ounces	or	150 c. c.
Distilled water to make altogether	"	20	"	1000 "
B. { Sodium carbonate (crystals) (avoird.)		11 ounces	or	138 grammes.
{ or ditto ditto (anhydrous)	"	4	"	50
Sodium sulphite (recrystd.)	"	15	"	188
Distilled water to make altogether	"	80	"	1000 c. c.

Equal parts of each to make developer.

A few drops of a 10 per cent. solution of potassium bromide may be added to the developer when necessary. In very hot weather the pyro bath should not be stronger than 1 lb. of sodium hyposulphite to 2 quarts of water or twenty per cent.

DEVELOPERS FOR THE "CADETT" LANTERN PLATES.

Warm Tones.—Pyro Ammonia.

A. Pyrogallic acid	40 grains	or	5 grammes.
Ammonium bromide	40	"	5 "
Potass. metabisulphite	120	"	14 "
Distilled water to make altogether (fluid)	20 ounces	"	1000 c. c.
B. Liq. ammoniæ	150 minims	or	16 c. c.
Distilled water to make altogether (fluid)	20 ounces	"	1000 "

Equal parts of A and B to make developer.

This formula gives rich warm tones with suitable exposure.

For warm black tones, the following may be used:—

A. Pyrogallic acid	30 grains	or	3.5 grammes.
Sodium sulphite	100	"	11 "
Sulphurous acid (or citric acid 5 grains)	5 minims	"	0.5 c. c.
Ammonium bromide	30 grains	"	3.5 grammes.
Distilled water to make altogether	20 ounces	"	1000 c. c.
B. Liq. ammoniæ 890	40 minims	or	4 c. c.
Distilled water to make altogether (fluid)	20 ounces	"	1000 "

Equal parts of A and B to make developer.

A rich warm black can be obtained with hydroquinone, and we strongly recommend the following formula:—

- A. Hydroquinone 70 grains or 8 grammes.
 { Potass metabisulphite 10 " " 1 " "
 { or sulphurous acid 15 minims " 1.5 c. c.
 Potassium bromide 35 grains " 4 grammes.
 Distilled water to make altogether (fluid) 20 ounces " 1000 c. c.
- B. Potassium hydrate (sticks) 140 grains or 16 grammes.
 Sodium sulphite 700 " " 80 "
 Distilled water to make altogether..... 20 ounces " 1000 c. c.

Equal parts of A and B to make developer.

Black Tones.

Cold, but brilliant black tones are obtained with ferrous oxalate, adding a sufficient quantity of a 10 per cent. solution of potassium bromide to prevent too rapid development.

- A. Ferrous sulphate(avoirdupois) 5 ounces or 250 grammes.
 Sulphuric acid 10 minims " 1 c. c.
 Distil. water to make altogether(avoird.) 20 ounces " 1000 "
- B. Neutral potass oxalate ...(avoirdupois) 10 ounces " 250 grammes.
 Distilled water to make altogether(fluid) 40 " " 1000 c. c.

Dissolve the potass oxalate in about $\frac{3}{4}$ of the distilled water, made warm, and make up to bulk after the salt is dissolved.

The ferrous sulphate should be powdered just before solution in about $\frac{3}{4}$ of the distilled water to which the sulphuric acid has been previously added. Make up to bulk after solution.

To make developer, add 1 part of A to 4 of B. For over-exposure add a few drops to the mixed developer of a 10 per cent. solution of potassium bromide.

THE KODAK COMPANY'S FORMULÆ.

FOR BROMIDE PAPER.

- No. 1. Oxalate of Potash 16 ounces or 333 grammes.
 Hot water..... 48 " " 1000 c. c.
- No. 2. Proto-sulphate of iron 16 ounces or 500 grammes.
 Hot water..... 32 " " 1000 c. c.
 { Acetic acid $\frac{1}{2}$ drachm " 2 "
 { or,
 { Citric acid $\frac{1}{2}$ ounce " 16 grammes.
- No. 3. Bromide of potassium 1 drachm or 14 grammes.
 Water 10 ounces " 1000 c. c.

These solutions must be cooled and kept separately, and should be mixed only for immediate use.

To develop, take in a suitable tray, No. 1, 6 ounces, or 120 c. c.; No. 2, 1 ounce, or 20 c. c.; No. 3, $\frac{1}{2}$ drachm, or 1 c. c. Mix in the order given; use cold. After exposure, soak the paper in water until limp;

then immerse in the developer. The image should appear slowly, and should develop up strong, clear, and brilliant. When the shadows are sufficiently black, pour off the developer and flood the plate with the

Clearing Solution.

Acetic acid 1 drachm or 4 c.c.

Water 32 ounces „ 1000 „

After fixing, wash thoroughly two hours, and hang up to dry. Use fresh developer for each batch of prints. With a glass-bottomed tray, eight ounces of developer are sufficient for a 25×30 print.

FOR KODAK FILMS.

No. 1. Sulphite of soda 6 ounces or 188 grammes.

Hot water 32 „ „ 1000 c.c.

When cold, add—

Pyrogalllic acid 1 ounce or 31 grammes.

No. 2. Carbonate of soda 3 ounces or 94 grammes.

Carbonate of potash 1 ounce „ 31 „

Water 32 ounces „ 1000 c.c.

To develop, take, for normal exposures, one part each of No. 1 and No. 2, together with two parts of water.

Restrainer.

Bromide of potassium 1 ounce or 167 grammes.

Water 6 ounces „ 1000 c.c.

If a number of films are fixed together in one tray, they should be put in *face down*, to avoid abrasion of the sensitive surface. It is well to move them about in the fixing bath, from time to time, in order to remove any air bubbles. After fixing, *wash thoroughly*; then immerse for one minute in the

Soaking Solution.

Water 16 ounces or 1000 c.c.

Glycerine $\frac{1}{2}$ ounce „ 31 „

Remove from the soaking solution, and pin up each film by *one* of its corners, to dry spontaneously. Any tear drops of the soaking solution should be removed with a bit of blotting-paper or absorbent cotton.

EDWARDS'S FORMULÆ.

PYRO AND AMMONIA DEVELOPER.

No. 1. Pyrogalllic acid 1 ounce or 30 grammes.

Citric acid 40 grains „ 3 „

Water $7\frac{1}{2}$ ounces „ 214 c.c.

No. 2. Strong ammonia '880 1 ounce or 28 c.c.

Bromide of potassium 120 grains „ 8 grammes.

Distilled water 7 ounces „ 200 c.c.

The above will keep good for months, if well corked.

For use, dilute 1 part No. 1 with 19 parts of water, and in another bottle 1 part No. 2 with 19 parts of water. The dilute solutions should be made fresh every day.

To develop a correctly exposed plate or film mix equal parts of these two solutions.

PYRO AND SODA DEVELOPER.

- No. 1. Pyrogallie acid 1 ounce or 30 grammes.
 Nitric acid 20 drops „ 1 c. c.
 Water 80 ounces „ 2 litres 300 c.c.
- No. 2. Sulphite of soda 10 ounces or 300 grammes.
 Carbonate of soda (washing soda) 8 „ „ 226 „
 Water 80 „ „ 2 litres 300 c.c.
- No. 3. Bromide of potassium 1 ounce or 30 grammes.
 Water 9 ounces „ 250 c. c.

To develop, mix equal parts of Nos. 1 and 2, and add 10 minims of No. 3 to each ounce of the mixed developer, or, instead, 3 ounces of No. 3 may be added to the 80 ounces of No. 2. For rapid shutter exposures, omit the bromide.

PYRO AND SODA DEVELOPER WITH METABISULPHITE.

- No. 1. Pyrogallie acid 1 ounce or 30 grammes.
 Metabisulphite of soda (Boake's) 1 „ „ 30 „
 Water 80 ounces „ 2 litres 300 c.c.
 Dissolve the metabisulphite, and then add the pyro.
- No. 2. Carbonate of soda (washing soda) 12 ounces or 360 grammes.
 Sulphite of soda 4 „ „ 120 „
 Water 80 „ „ 2 litres 300 c.c.
- No. 3. Bromide of potassium 1 ounce or 30 grammes.
 Water 9 ounces „ 250 c.c.

To develop, mix equal parts of Nos. 1 and 2. When working in the summer time in a good light, with full exposure, add 5 minims of No. 3 to each ounce of developer (or to save the trouble of measuring small quantities, $1\frac{1}{2}$ ounces of No. 3 may be added to the 80 ounces of No. 2). In winter the bromide may generally be omitted, and also for rapid shutter exposures, and portrait work in the studio.

HYDROQUINONE DEVELOPER.

- No. 1. Hydroquinone $\frac{1}{2}$ ounce or 7 grammes.
 Sulphite of soda 1 „ „ 30 „
 Bromide of potassium 7 grains „ $\frac{1}{2}$ gramme.
 Distilled boiling water to make 12 ounces „ 340 c. c.
- No. 2. Carbonate of potash $\frac{1}{2}$ ounce or 15 grammes
 Distilled water to make 12 ounces „ 340 c. c.

First dissolve the hydroquinone, and then add the sulphite and bromide.

For use mix equal parts of Nos. 1 and 2.

In case of slight over-exposure add a few drops or minims of a 10 per cent. solution of bromide of potassium to each ounce of developer, more or less according to the extent of over-exposure. For considerable over-exposure use the redeveloper.

For under-exposure, pour off the hydroquinone developer and finish development with the eikonogen developer given below.

EIKONOGEN DEVELOPER.

Eikonogen	$\frac{1}{2}$ ounce	or	14 grammes.
Carbonate of Potash	1	"	30 "
Sulphite of soda	2 ounces	"	60 "
Distilled boiling water	20	"	600 c. c.

First dissolve the eikonogen, then the sulphite, and lastly the carbonate or potash.

Instead of mixing the developer, the development may be commenced with eikonogen, and when the detail is sufficiently out, hydroquinone substituted for the eikonogen till a white line is visible, and the development finished with this, or in case of much over-exposure with the following hydroquinone redeveloper.

HYDROQUINONE REDEVELOPER.

No. 1. Hydroquinone	$\frac{1}{2}$ ounce	or	7 grammes.
Sulphite of soda	2 ounces	"	60 "
Bromide of potassium	$\frac{1}{4}$ ounce	"	7 "
Distilled boiling water to make	12 ounces	"	340 c. c.

No. 2. Carbonate of soda (washing soda)	2 ounces	or	60 grammes.
Sulphite of soda	2	"	60 "
Distilled water to make	12	"	340 c. c.

For use mix equal parts of Nos. 1, and 2.

EDWARDS'S GELATINO-CHLORIDE PLATES.

Development.

Make two stock solutions as follows:—

No. 2. Neutral oxalate of Potash ...	2 ounces	or	100 grammes.
Chloride of ammonium	40 grains	"	5 "
Distilled water	20 ounces	"	1000 c. c.
No. 2. Sulphate of iron	4 drachms	or	25 grammes.
Citric acid	2	"	12.5 "
Alum	2	"	12.5 "
Distilled water	20 ounces	"	1000 c. c.

The above solutions will keep indefinitely.

When required for use, mix equal portions of the above solutions, adding No. 2 to No. 1, to form the developer.

EDWARDS'S SPECIAL TRANSPARENCY PLATES.

*Pyro and Ammonia Developer.**Warm Tones.*

No. 1. Pyrogalic acid	1 ounce	or	30 grammes.
Sulphite of soda	4 ounces	"	120 "
Citric acid	$\frac{1}{4}$ ounce	"	8 "
Water to make	16 ounces	"	460 c. c.

First dissolve the sulphite and citric acid, and then add the pyrogalic.

No. 2. Bromide of ammonium	1 ounce	or	30 grammes.
Liq. ammoniæ '880	5½ drachms	„	20 c. c.
Water to make.....	16 ounces	„	460 c. c.

For use, mix 1 part of No. 1 and 3 parts of No. 2, and dilute with water to double the quantity.

Hydroquinone Developer.

Black Tones.

Hydroquinone	60 grains	or	3 grammes.
Sulphite of soda	2 ounces	„	45 „
Carbonate of soda (crystals)...	4 „	„	90 „
Carbonate of potash	2 „	„	45 „
Bromide of potassium.....	40 grains	„	2 „
Hot distilled water	20 ounces	„	450 c. c.

For black and white line subjects add 1 drachm of a 60 grain solution of bromide of potassium to each ounce of developer.

Dissolve the hydroquinone in the water, and add the other ingredients in the order named.

Amidol Developer.

Black Tones.

Amidol	80 grains	or	5 grammes.
Soda sulphite	2 ounces	„	60 „
Bromide of potassium.....	½ ounce	„	15 „
Water	12 ounces	„	360 c. c.

ELLIOTT & SONS' FORMULÆ.

THE "BARNET" PLATES, ORDINARY.

No. 1. Ammonia ('880)	1½ ounce	or	75 c. c.
Water	20 ounces	„	1000 c. c.
No. 2. Pyrogallic acid.....	160 grains	or	18 grammes
Bromide of ammonium	¾ ounce	„	38 „
Water	20 ounces	„	1000 c. c.
Pure nitric acid	10 drops	„	1 „

For use, mix ½ an ounce of No. 1. ½ an ounce of No. 2 with 3 ounces of water.

Pyro and Ammonia (10 per cent Solution).

No. 1. Ammonia ('880)	1 ounce	or	100 c. c.
Water.....	9 ounces	„	900 „
No. 2. Bromide of ammonium	1 ounce	or	100 grammes.
Water, to make.....	10 ounces	„	1000 „
No. 3. Pyro	1 ounce	„	100 grammes.
Water, to make	10 ounces	„	1000 c. c.
Nitric acid, pure	20 drops	„	4 „

For studio use, take 80 minims (10 c. c.) No. 1, 40 minims (5 c. c.) No. 2, 20 minims ($2\frac{1}{2}$ c. c.) No. 3, and make up to 2 ounces (120 c. c.) with water.

The above developer is the same strength as that recommended on the boxes.

For outdoor work, take 80 minims No. 1, 60 minims No. 2, 40 minims No. 3, and make up to 2 ounces with water.

Pyro and Soda Developer.

Solution No. 1.

Pyro	1 ounce	or	12 grammes.
Water.....	86 ounces	„	1000 c. c.
Nitric acid, pure	20 drops	„	0.5 „

Solution No. 2.

Pure sulphite soda	10 ounces	or	116 grammes.
Pure carbonate soda (crystals)	9	„	105 „
Water.....	86	„	1000 c. c.

Use equal parts of Nos. 1 and 2, and dilute with equal bulk of water. To each ounce add 1 or 2 drops of a ten per cent. solution of bromide of potassium.

“BARNET” LANTERN TRANSPARENCY PLATES.

For Cold or Warm Tones (according to exposure and development).

INSTRUCTIONS FOR USE.

Contact Printing.—For black tones the exposure required is about 10 seconds at a distance of 1 foot from an ordinary gas flame; the developer to be used is either No. 1 or 2.

To secure warm tones it is necessary to increase the exposure to 2 or 3 minutes and use formula either No. 3 or 4.

To obtain still warmer (reddish) tones, increase the exposure still further to 5 or 6 minutes and develop with formula No. 5.

Reductions in the Camera.—For black tones with stop *f*-16 in bright diffused light from a half-plate negative an exposure of about 10 seconds is required, using formula No. 1 or 2 for developing.

For warm tones increase the exposure to 2 or 3 minutes and using for developer either formula No. 3 or 4.

For still warmer tones further increase the exposure to 5 or 6 minutes and develop with formula No. 5.

FORMULÆ FOR DEVELOPERS.

Note.—In cold weather all solutions should be raised to a temperature of 60°.

Cold Black Tones.

A

No. 1. Metol	400 grains	or	11 grammes,
Soda sulphite	8 ounces	„	100 „
Water.....	80	„	1000 c. c.

B.

Carbonate of potash.....	1200 grains or	34 grammes.
Ammonium bromide.....	240 " "	7 "
Potassium bromide	480 " "	14 "
Water	80 ounces "	1000 "

Take equal parts of A and B.

Note.—The ammonium bromide is necessary for the production of absolutely cold black tones ; a larger quantity is not recommended, as it tends to produce a slight veil in the high lights.

Length of time in developing about 2 minutes.

Warm Black Tones.

A.

No. 2. Hydroquinone	640 grains or	18 grammes.
Soda sulphite	8 ounces "	100 "
Potass bromide.....	120 grains "	3 "
Water	80 ounces "	1000 c. c.

B.

Sodium hydrate.....	640 grains or	18 grammes.
Water.....	80 ounces "	1000 c. c.

Take equal parts of A and B.

This produces a very pleasing warm black. Length of time in developing about 2 minutes.

Warm Brown Tones.

A.

No. 3. Pyro	1 ounce or	12.5 grammes.
Soda sulphite	4 ounces "	50 "
Water	80 " "	1000 c. c.

B.

Carbonate of ammonia	900 grains or	26 grammes.
Potassium hydrate	750 " "	21 "
Ammonium bromide	600 " "	17 "
Water	80 ounces "	1000 c. c.

Take equal parts of A and B.

Length of time in developing about 2 minutes.

Or the following may be used:—

No. 4.—Take equal parts of No. 2 formula and add to each ounce (100 c. c.) 3 grains (.6 gramme) each of carbonate of ammonia and ammonium bromide.

Length of time in developing about 3 or 4 minutes.

Very Warm (Reddish) Tones.

No. 5.—Take equal parts of No. 2 formula and add to each ounce (100 c. c.) 6 grains (1.2 gramme) each of carbonate of ammonia and ammonium bromide.

Length of time in developing about 8 minutes.

Fixing Bath.

We recommend the bath not to be made stronger than

Hypo	5 ounces or	250 grammes.
Water.....	20 ,, ,,	1000 c. c.

Clearing solutions will not be found necessary with these plates.

BARNET BROMIDE PAPER.

(Extra Rapid.)

Platino Matt Surface.—Directions for Working.

Exposure.—For contact work from an average negative about 4 seconds, 18 inches from an ordinary gas burner.

For enlarging it is impossible to give any fixed data, so much depending upon the source of light. It is recommended to make a trial exposure upon a small piece of paper.

After exposure place the print, sensitive side upwards, in a clean developing dish, flood with water for a few seconds, drain off water, and then with one sweep cause the developer to flow evenly and quickly over the whole surface of the print.

Developers.—Ferrous-oxalate.

A. Oxalate of potash.....	1 pound or	333 grammes.
Bromide potass.....	5 grains ,,	0.2 gramme.
Hot water	48 ounces ,,	1000 c. c.
B. Sulphate of iron	1 pound or	500 grammes.
Citric acid.....	$\frac{1}{2}$ ounce ,,	16 ,,
Hot water	32 ounces ,,	1000 c. c.

Take 6 ounces of A and 1 ounce of B.

Immediately after developing, the print must be transferred straight into the acid bath.

Acetic acid	1 drachm or	4 c. c.
Water	32 ounces ,,	1000 ,,

We strongly recommend the following

Metol Developer.

A. Metol	400 grains or	11 grammes.
Sodium sulphite	8 ounces ,,	100 ,,
Potass. bromide	50 grains ,,	1.4 ,,
Water	80 ounces ,,	1000 c. c.
B. Potass carbonate.....	8 ounces or	100 grammes.
Water.....	80 ,, ,,	1000 c. c.

To produce softer results, either of the above may be diluted with an equal quantity of water.

After fixing, wash thoroughly in several changes of water for at least 2 hours, squeeze off the superfluous moisture, and hang up to dry.

THE EUROPEAN BLAIR CAMERA COMPANY'S FORMULÆ.

To develop the films soak in water first till limp.

Metol-Hydroquinone Developer.

Metol	75 grains	or	3.75 grammes.
Hydroquinone	100	"	5.0
Sodium sulphite	4	"	100
Sodium carbonate	2 ounces	"	50
Water to	40	"	1000 c. c.

Ortol Developer.

1. Ortol	130 grains	or	15 grammes.
Potassium metabisulphite...	65	"	7.5
Water to	20 ounces	"	1000 c. c.
2. Sodium carbonate	2	"	100 grammes.
Potassium bromide	20 grains	"	0.25
Sodium sulphite	2 ounces	"	100
Water to	20	"	1000 c. c.

For use mix in equal parts.

In all cases of time exposures and for positive work add to the above developers potassium bromide $\frac{1}{4}$ grain per ounce, or 0.5 gramme per 1000 c. c.

As soon as sufficiently developed, rinse the film well in water and place in a fixing bath of

Hypo	4 ounces	or	250 grammes.
Sodium bisulphite	1 ounce	"	62
Water to	20 ounces	"	1000 c. c.

Do not expose to white light till thoroughly fixed.

FOR THE "PREMIER" DRY PLATES.

Pyro-Soda Developer.

1. Pyrogalllic acid	120 grains	or	12 grammes.
Sodium sulphite	2 ounces	"	100
Potassium bromide	10 grains	"	1 gramme.
Water	20 ounces	"	1000 c. c.
2. Sodium carbonate	2½	"	125 grammes.
Water	20	"	1000 c. c.

For use mix equal parts of 1 and 2. If the plate be under-exposed add more of No. 2; if over-exposed, use less of No. 2 and more of No. 1.

Hydroquinone-Metol Developer.

1. Hydroquinone	50 grains	or	5 grammes.
Metol	50	"	5
Sodium sulphite	1 ounce	"	50
Potassium bromide	20 grains	"	2
Water	20 ounces	"	1000 c. c.

2. Sodium Carbonate..... 2 ounces or 100 grammes.
 Water 20 " " 1000 c.c.

For use take equal parts of each. This developer can be used several times in succession.

Fixing Bath.

- Hyposulphitesoda 4 ounces.
 Water 20 "

Allow the plates to remain in this bath for a minute or two after they seem fixed, and wash well.

GEM DRY PLATE COMPANY'S FORMULÆ.

DEVELOPER FOR PLATES AND FILMS.

- No 1. Pyrogalllic acid 1 ounce or 20 grammes.
 Potassium bromide 60 grains " 3 "
 Sulphite of soda..... 6 ounces,, 120 "
 Water to 50 " " 1000 c.c.
- No. 2. Washing soda 6 ounces or 120 grammes.
 Water to 50 " " 1000 c.c.

For use, take equal quantities of No. 1 and No. 2.

For known under-exposure use an increased proportion of No. 2.

For known over-exposure use larger quantity of No. 1.

Alum Bath.

- Alum..... 1 ounce or 50 grammes.
 Water 20 ounces,, 1000 c.c.

Wash before and after immersing in the alum bath.

Fixing Solution.

- Hypo..... 1 pound or 250 grammes.
 Water 64 ounces,, 1000 c.c.

LANTERN PLATES.

Developer for Cold or Warm Tones.

(Cold Tones.)

Hydroquinone.

- A. Hydroquinone..... $\frac{1}{2}$ ounce or 25 grammes.
 Citric acid $\frac{1}{4}$ " " 12.5 "
 Potassium bromide 60 grains " 7 "
 Water 20 ounces,, 1000 c.c.
- B. Caustic soda $\frac{1}{2}$ ounce or 25 grammes.
 Sodium sulphite..... 20 " " 150 "
 Water 3 ounces, 1000 c.c.

For use, take equal parts of A. and B, and dilute with water equal to their combined bulk.

(Warm Tones.)

C. Ammonium carbonate	1 ounce or	50 grammes.
Ammonium bromide.....	1 " "	50 "
Water	20 ounces,,	1000 c. c.

For use, take of the above hydroquinone formula 2 parts, and add 1 part of C.

In obtaining either cold or warm tones, it is well to remember that exposure is the greatest factor. For cold tones, an exposure of 10 to 20 seconds, 1 foot from a No. 5 gas burner, will be ample, and develop as above. For warm and deeply coloured tones, expose from 30 seconds to 3 minutes, and develop with addition of C, always using a slightly increased proportion of C as the exposure is prolonged.

THE ILFORD FORMULÆ.

Stock Solutions.

A. Water.....	5½ ounces or	550 c. c.
Nitric acid	20 minims "	1 "
Pyrogalllic acid	1 ounce "	100 grammes

This solution will keep good for several weeks.

Or B. Water	5½ ounces or	550 c. c.
Potassium metabisulphite.....	70 grains "	15 grammes.
Pyrogalllic acid	1 ounce "	100 "

This solution will keep good for several months.

Working Solutions.

No. 1.

Stock solution of pyro, A or B ...	1 to 2 ounces or	100-200 c. c.
Water to make up to	20 " "	1000 "

No. 2.

Sodium carbonate, crystals (not bi-carbonate)..... (avoirdupois)	2 ounces or	100 grammes.
Sodium sulphite.....	2 " "	1000 "
Potassium bromide.....	20 grains "	2 "
Water to make up to	20 ounces "	1000 c. c.

For normal exposures take equal quantities of Nos. 1 and 2.

The quantity of stock solution to be used must be regulated by the quality of negative desired. When a full quantity is used, the result is a slowing of the plate, and, at the same time, greater density or contrast of light and shade.

Pour the developer carefully over the plate, avoiding air bubbles, rock the dish, carefully keeping the plate well covered with solution. To obtain proper density, allow the plate to remain after all detail is out. Judge of this by looking through the plate.

To compensate for errors of exposure, the proportions of Nos. 1 and 2 can be varied thus: for under-exposure use more of No. 2 than of No. 1,

and for over-exposure more of No. 1 than of No. 2. It is a good plan, when there is a doubt as to the exposure being correct, to commence the development with twice the quantity of No. 1 than of No. 2, and add more of No. 2 if found desirable. To compensate for under-exposure, the mixed developer can also be diluted with water, of course allowing a longer time for its action.

Alum Bath.—After developing, wash the plate well under the tap, and immerse for a few minutes in alum, $1\frac{1}{2}$ ounces; water 20 ounces.

Fixing.—Wash well again, and fix as usual. Hyposulphite of soda, 1 pound; water 40 ounces. Allow to remain in this bath for several minutes after fixation is apparently completed.

Never omit the alum bath in hot weather or under other conditions likely to produce frilling.

ILFORD P.O.P.

Working Instructions.

Printing.—This should be done in shade by preference, unless negatives are specially strong in contrast. The image loses very little depth in toning, &c.

First washing.—For 10 minutes in several changes.

Hardening Bath.—Soak the prints in

Alum.....	1 ounce.
Common salt	1 „
Water	20 ounces.

for 5 to 10 minutes, keeping them moving all the time.

Second washing.—For 10 minutes in several changes.

Toning.—Any of the recognised formulæ for this class of paper may be used, but for simplicity and excellence of results we recommend the following. Make up the following stock solutions:—

No. 1. Ammonium sulphocyanide.....	100 grains.
Water.....	10 ounces.
No. 2. Sodium sulphite	10 grains.
Water.....	10 ounces.

This solution must be made up only on the day of using; any left over must be thrown away.

No. 3. Gold chloride.....	15 grains.
Water	15 ounces.

When mixing either of the following toning baths, bear in mind that this solution must be added last of all.

For the usual toning bath, take 2 ounces of each of Nos. 1 and 3 and make up to 20 ounces with water.

For the special toning bath, which is strongly recommended, take 2 ounces of each of Nos. 1, 2, and 3, and make up to 20 ounces with water.

Third washing.—For 5 minutes in several changes.

Fixing.—Use new solution for each batch of prints. The following is best strength:—

Hypo.....	3 ounces.
Water	20 „

Fixation is complete in about 10 minutes.

Final Washing.—For at least 2 hours in running water, or many changes.

Mounting.—Mount with starch paste in the usual way. Prints thus treated and passed through roll give a fine glossy surface, better than albumen. This paper will also give prints of enamelled surface by squeegeeing down on glass in the usual way.

Special notes.—Do not use any excess of sulphocyanide or sulphite over the quantity mentioned.

Use the washing water and all solutions as cold as possible.

Keep the prints moving whilst in the various solutions.

ILFORD BROMIDE PAPER AND OPALS.

Development.—Make the following solutions and use when cold:—

No. 1. Sulphate of iron	2½ ounces or 250 grammes.
Sulphuric acid	15 drops „ 3 c. c.
Warm water up to	10 ounces „ 1000 „
No. 2. Neutral potassium oxalate ...	10 ounces or 250 grammes.
Potassium bromide	20 grains „ 1 gramme.
Warm water up to	40 ounces „ 1000 c. c.

For use, add 1 ounce No. 1 to 4 ounces No. 2, not *vice versa*.

In cases of over-exposure or weak negatives, it is advisable to use half new and half old developer, to give greater brilliancy. Development is complete when image appears fully out. After development and without washing, immerse the prints for about 2 minutes in clearing solution, pour off and repeat.

Clearing Solution.

Water	80 ounces or 1000 c. c.
Glacial acetic acid	½ ounce „ 6·5 „

Then wash thoroughly for about 10 minutes in several changes of water. All the acid must be removed, or fading of prints will result.

Alternative Method of Development.

No. 1. Metol	50 grains or 5·0 grammes.
Hydroquinone	25 „ „ 2·5 „
Sodium sulphite	1 ounce „ 50 „
Water up to	20 ounces „ 1000 c. c.
No. 2. Sodium carbonate (crystals) ½ ounce	or 25 grammes.
Potassium bromide	30 grains „ 3 „
Water up to	20 ounces „ 1000 „

Take equal quantities of No. 1 and No. 2.

It is important to note that no clearing solution is required with this developer.

Fixing.

Water 20 ounces or 1000 c. c.

Hyposulphite of soda.....(avd.) $\frac{1}{4}$ pound „ 200 „

Allow 15 minutes for thorough fixation. Use fresh solution for each batch of prints.

After fixing, wash for 2 hours in running water or in frequent changes. Allow prints to dry naturally. Work with clean hands and clean dishes.

ILFORD FORMULÆ IN METRIC MEASURES.

ILFORD PLATES.

Stock Solutions.

A. Pyro.....28.4 grammes (1 ounce),

Nitric acid..... 20 drops.

Water 150 c. c.

Or B. Pyro 28.4 grammes.

Potassium metabisulphite 5 „

Water 150 c. c.

Working Solutions.

No. 1. Stock solution of pyro A or B 25 to 50 c. c.

Water to make up to 500 „

No. 2. Sodium carbonate..... 50 grammes.

Sodium sulphite 50 „

Potassium bromide 1.2 „

Water to make up to 500 c. c.

Alum Bath.

Alum 30 grammes.

Water 400 c. c.

Fixing.

Hypo 400 grammes.

Water 1000 c. c.

ILFORD P.O.P.

Hardening Bath.

Alum 25 grammes.

Common salt 25 „

Water 500 c. c.

Toning.

No. 1. Ammonium sulphocyanide 8 grammes.

Water 350 c. c.

No. 2. Sodium sulphite 0.8 gramme.

Water 350 c. c.

No. 3. Gold chloride (15 grain tube)..... 1 gramme.

Water 425 c. c.

Fixing.

Hypo	75 grammes.
Water	500 c. c.

ILFORD BROMIDE PAPER AND OPALS.

Developer.

No. 1. Sulphate of iron	50 grammes.
Sulphuric acid	10 drops.
Warm water up to	200 c. c.
No. 2. Potassium oxalate	200 grammes.
Potassium bromide	1 gramme.
Warm water up to	800 c. c.

Clearing Solution.

Glacial acetic acid	10 c. c.
Water	1600 "

Alternative Developer.

No. 1. Metol	4 grammes.
Hydroquinone	2 "
Sodium sulphite	35 "
Water up to	700 c. c.
No. 2. Sodium carbonate	17½ grammes.
Potassium bromide	2.4 "
Water up to	700 c. c.

Fixing.

Hypo	100 grammes.
Water	500 c. c.

PLATONA—ILFORD PLATINUM PAPER.

Printing.

Printing time and pad should be quite dry.

Print until all details are faintly visible. Examine in weak light only.

Developing Formula—Stock Solution.

Potassium oxalate	2 ounces.
Potassium phosphate	½ ounce.
Water	14 ounces.

If unable to obtain potassium phosphate, the sodium phosphate may be substituted, but the former is preferable.

Dissolve the salts in hot water and allow to cool. This solution will keep indefinitely.

For use, take 1 part stock solution and 1 part water.

Develop in weak artificial or diffused light, floating prints face downwards in the solution. The image does not lose in fixing.

Fixing.

Pure hydrochloric acid	1 ounce.
Water	80 ounces.

Immerse prints for about 5 minutes each in three consecutive baths, and then give them a final washing in water for 15 minutes:

The prints are then ready to be dried and mounted.

Platona paper must be always kept stored in the tubes in which it is bought, and if so kept will remain in good condition. The cap should be kept screwed up, so that the tube is air-tight. Do not screw it up too hard, or it may be difficult to remove.

THE IMPERIAL COMPANY'S FORMULÆ.

"STANDARD" DEVELOPER.

No. 1.

Pyrogallie acid.....	55 grains or	6 grammes
Metol	45 " "	5 "
Metabisulphite of potash	120 " "	14 "
Bromide of potassium.....	20 " "	2 "
Water (boiled or distilled) to ...	20 ounces "	1000 c. c.

No. 2.

Carbonate of soda (washing soda)	4 ounces or	200 grammes.
Water (boiled or distilled) to ...	20 " "	1000 c. c.

For use take equal parts of No. 1 and No. 2.

"UNIVERSAL" DEVELOPER.

No. 1.

Metol	40 grains or	5 grammes.
Hydroquinone	50 " "	6 "
Sulphite of soda	120 " "	14 "
Bromide of potassium	15 " "	2 "
Water (boiled or distilled) to ...	20 ounces "	1000 c. c.

No. 2.

Caustic potash	180 grains or	21 grammes.
Water (boiled or distilled) to ...	20 ounces "	1000 c. c.

For use take equal parts of No. 1 and No. 2.

"PYRO-SODA" DEVELOPER.

Stock Solution.

Pyrogallie acid	1 ounce or	111 grammes.
Bromide of potassium	60 grains "	13 "
Metabisulphite of potash	50 " "	10 "
Water (boiled or distilled) to ...	12 ounces "	1000 c. c.

No. 1.

Stock solution	3 ounces or	150 c. c.
Water (boiled or distilled).....	20 " "	1000 "

No. 2.

Sulphite of soda	2 ounces or	100 grammes.
Carbonate of soda (washing soda)	2 " "	100 "
Water (boiled or distilled) to ...	20 " "	1000 c. c.

For use take equal parts of No. 1 and No. 2.

"IMPERIAL METOL" DEVELOPER.**No. 1.**

Metol	100 grains or	11.4 grammes.
Metabisulphite of potash.....	10 " "	1 "
Bromide of potassium	20 " "	2 "
Water (boiled or distilled) to...	20 ounces "	1000 c. c.

No. 2.

Sulphite of soda.....	2 ounces or	100 grammes.
carbonate of soda	2 " "	100 "
Water (boiled or distilled) to...	20 " "	1000 c. c.

For use take equal parts of No. 1 and No. 2.

"HYDROQUINONE" DEVELOPER.**No. 1.**

Hydroquinone	150 grains or	16 grammes.
Metabisulphite of potash.....	10 " "	1 "
Bromide of potassium	50 " "	6 "
Water (boiled or distilled) to...	20 " "	1000 c. c.

No. 2.

Sulphite of soda	2 ounces or	100 grammes.
Caustic soda	100 grains "	11 "
Water (boiled or distilled) to...	20 ounces "	1000 c. c.

For use take equal parts of No. 1 and No. 2.

After using this developer, always rinse the negative well before transferring to the fixing-bath.

"SINGLE-SOLUTION" DEVELOPER.

Metol	50 grains or	5.5 grammes.
Hydroquinone	40 " "	4.5 "
Sulphite of soda.....	500 " "	57 "
Bromide of potassium	25 " "	3 "
Carbonate of soda	500 " "	57 "
Water (boiled or distilled) to...	20 ounces "	1000 c. c.

IMPERIAL "SPECIAL" LANTERN PLATES.

For producing Transparencies of a Black Tone.

The exposure required for a negative of ordinary density will be about 5 seconds, at a distance of 24 inches from a medium-size gas-burner.

Developing formula (hydroquinone) is the same as that used with our ordinary plates.

For development, use 1 part of No. 1 to 1 part of No. 2, and 1 part of water.

Metol developer is also excellent.

After development, the manipulations, washing, &c., will be the same as for negatives.

IMPERIAL "SLOW" LANTERN PLATES.

For producing Transparencies of a Warm Tone.

The exposure required for a negative of ordinary density will be about 15 seconds, at a distance of 12 inches from a medium-size gas burner.

Developing formula (hydroquinone) is the same as that used with "special" lantern plates.

IMPERIAL BROMIDE OPALS.

DEVELOPERS.

Metol. A.

No. 1. Metol	50 grains or	11.4 grammes.
Disolve in water	10 ounces „	1000 c. c.
Then add soda sulphite	1 ounce „	100 grammes.
No. 2. Soda carbonate (washing soda) ...	2 ounces or	200 grammes.
Water to	10 „ „	1000 c. c.
No. 3. Potassium bromide	$\frac{1}{2}$ ounce or	50 grammes.
Water to	10 ounces „	1000 c. c.

The developer for normal exposures to consist of 3 parts of No. 1 to 1 part of No. 2, to each ounce of which may, as a rule, be added 20 minims of No. 3.

Oxalate and Iron. B.

N. 1. Potash oxalate	4 ounces or	250 grammes.
Water	16 „ „	1000 c. c.
No. 2. Iron sulphate	3 ounces or	250 grammes.
Water	12 „ „	1000 c. c.
Citric acid	50 grains „	9 grammes.

Add 1 ounce of No. 2 to 5 ounces of No. 1; and to every ounce (30 c. c.) of developer add about 10 drops of a ten per cent. solution of potassium bromide.

No. 2 solution must always be added to No. 1 and not *vice versa*.

MARION'S FORMULÆ.

For portraiture the following is recommended:—

PYRO STOCK SOLUTION.

Pyrogallie acid	1 ounce or	50 grammes.
Sodium sulphite	4 ounces „	200 „
Sulphuric acid	1 drachm „	6 c. c.
Water to make up	20 ounces „	1000 „

SODA STOCK SOLUTION.

Sodium carbonate cryst.	8 ounces or	400 grammes.
Sodium sulphite	4 „ „	200 „
Potassium bromide	1 drachm „	7 „
Water to make up	20 ounces „	1000 c. c.

For Development.

Five ounces of each stock solution made up separately to 20 ounces (1000 c. c.) with water and mixed in equal parts at the time of using. When very soft negatives are required—or only a minimum of exposure can be given—the bromide of potassium may be omitted.

PYRO-AMMONIA.

Pyrogalllic acid.....	1 ounce	or	100 grammes.
Ammonium bromide	1 "	"	100 "
Citric acid.....	1 drachm	"	14 "
Water to make up	10 ounces	"	1000 c. c.

AMMONIA.

Strongest liquid ammonia .880	2 ounces	or	200 grammes.
Water to make up	10 "	"	1000 c. c.

Two ounces of each of above separately made with water to 20 ounces (1000 c. c.) form the solutions for use, equal parts being mixed together at the time of development.

HYDROQUINONE DEVELOPER.

Hydroquinone Solution.

Hydroquinone	40 grains	or	9 grammes.
Sodium sulphite, pure.....	120 "	"	27 "
Potassium brom.	5 "	"	1 "
Citric acid.....	5 "	"	1 "
Water to make up to	10 ounces	"	1000 c. c.

Alkali Solution.

Potass. hydrate, pure	120 grains	or	27 grammes.
Water to make up to	10 ounces	"	1000 c. c.

This developer, mixed in equal proportions, will contain per ounce: Hydroquinone, 2 grains; sulphite, 6 grains; brom., $\frac{1}{4}$ grain; citric, $\frac{1}{4}$ grain; hydrate, 4 grains.

FOR GELATINO-CHLORIDE PLATES.

IRON.

For Cold Tones.

No. 1. Potass. citrate	100 grains	or	230 grammes.
Potass. oxalate.....	30 "	"	69 "
Hot distilled water to make up to	1 ounce	"	1000 c. c.

For Warm Tones.

No. 2. Citric acid.....	90 grains	or	206 grammes.
Ammonium carbonate	60 "	"	137 "
Cold distilled water to make up to	1 ounce	"	1000 c. c.

For Extra Warm Tones.

No. 3. Citric acid.....	130 grains	or	297 grammes.
Ammonium carbonate	40 "	"	92 "
Cold distilled water to make up to	1 ounce	"	1000 c. c.

In mixing the solutions Nos. 2 and 3, it is better to place the crystals of the salts into a deep vessel, and, after adding the water, leave alone till all effervescence ceases. It is advisable to make it over night.

To three parts of either of the above add one part of the following at the time of using:—

Sulphate of iron	120 grains or	275 grammes.
Sulphuric acid	1 drop „	2 c. c.

Make up with distilled water to 1 ounce 1000 c. c.

Either of these developers should give clear glass in the unexposed parts of the picture; but, if at any time the slightest fog is found, it should at once be cured by the addition of a trace of either potassium bromide or sodium chloride. Bromide is better with No. 1, and chloride with either No. 2 or No. 3. A convenient form of using these will be to keep a ten per cent. solution of each of these salts, and one or two minims to each ounce of developer will be found a powerful restrainer.

HYDROQUINONE.

No. 1. Hydroquinone	48 grains or	11 grammes.
Sodium sulphite	320 „ „	73 „
Ammonium bromide	2 „ „	0.5 „
Water to make up to	10 ounces „	1000 c. c.
No. 2. Ammonium carbonate.....	100 grains or	23 grammes.
Sodium carbonate	100 „ „	23 „
Water to make up to	10 ounces „	1000 c. c.

Equal proportions of each are mixed together, according to size of plate to be developed at the time of using.

Different alkalies may be substituted for those mentioned, such as potassium carbonate, sodium silicate, potassium hydrate, sodium hydrate, &c.; but, in all cases, a small proportion of bromide should be used.

A number of plates may be developed one after the other in the same solution.

EIKONOGEN.

This developing agent, first introduced by us, will be found to give admirable results of a pleasing colour.

Formula.

Sulphite soda, pure	200 grains or	46 grammes.
Eikonogen	50 „ „	11 „
Potassium bromide	5 „ „	1 „
Water to make up to	10 ounces „	1000 c. c.
Sodium carbonate.....	160 grains or	37 grammes.
Water to make up to	10 ounces „	1000 c. c.

Equal parts to be mixed together at time of using.

FOR CHLORO-BROMIDE PLATES.

Pyrogallio Development.

A. Pyrogallic acid	40 grains or	9 grammes.
Pure sodium sulphite	16 „ „	4 „
Citric acid	5 „ „	1 „
Water	10 ounces „	1000 c. c.

B. Liq. am. fort.....	40 minims or	8.3 c. c.
Potassium bromide	40 grains	9 grammes.
Water to make up to	10 ounces	1000 c. c.

Equal parts of the solutions to be mixed at the time of using.

A very pleasing warm colour will be obtained by adding to the B solution 200 grains (46 grammes) of ammonium carbonate, but the time of development will be increased.

Ferrous-oxalate Development.

The saturated solutions of potassic oxalate and iron sulphate may be used in the proportion of three or four parts of the former to one of the latter, with the addition of one grain of potassium bromide to each ounce of developer, adding more bromide and increasing the amount of exposure when warmer tones are required.

To keep the iron solution from oxidising, one drop of sulphuric acid should be added to each ounce of water before dissolving the salt.

The ferrous oxalate gives a blacker coloured image than pyrogallic developer.

The time of development will vary from two to four minutes, according to temperature and density of image required.

Hydroquinone Developer.

Hydroquinone Solution.

Hydroquinone	40 grains or	9 grammes.
Sodium sulphite, pure.....	120 " "	27 " "
Potassium bromide	5 " "	1 gramme.
Citric acid	5 " "	1 " "
Water to make up to	10 ounces	1000 c. c.

Alkali Solution.

Potassium hydrate, pure.....	80 grains or	18 grammes.
Water to make up to	10 ounces	1000 c. c.

Equal parts to be mixed together at time of using.

It is advisable that all solutions should be made with distilled water, though not absolutely essential.

Several plates may be developed in the same solution.

EIKONOGEN DEVELOPER.

This developer will be found to suit these equally well with slight modification.

A small proportion of bromide must be used to ensure absolute clearness in the unexposed parts.

Formula.

Sodium sulphite	400 grains or	91 grammes.
Potassium bromide	5 " "	1 " "
Eikonogen	100 " "	23 " "
Water	10 ounces	1000 c. c.

Sodium carbonate

320 grains or 73 grammes.

Water to make up to

10 ounces 1000 c. c.

Equal parts of each to be mixed together at time of using.

FOR ARGENTIC BROMIDE OPALS.

Formula for Amidol Developers.

Amidol	20 grains or	5 grammes.
Sodium sulphite	200 " "	46 "
Potassium bromide	20 " "	5 "

Made up to 10 ounces (1000 c. c.) with water.

Form the developer in one solution ready for use. Plates developed with this formula will not require the acid bath previous to fixing.

Formula for Eikonogen Developer.

Eikonogen	40 grains or	9 grammes.
Sodium sulphite	160 " "	37 "
Lithium carbonate	2 " "	0.5 "
Water to make up to	10 ounces,	1000 c. c.

This will keep for a considerable time if well corked.

One drop of a ten per cent. solution of potassium bromide may be added to each ounce of developer.

Plates developed with eikonogen will not require the acid bath previous to fixing.

MAWSON & SWAN'S FORMULÆ.

THE "MAWSON," "ELECTRIC," OR "CASTLE" PLATE.

DEVELOPERS.

Pyro-ammonia Developer.

Stock Solution (ten per cent.).

Pyrogallic acid	480 grains or	110 grammes.
Bromide of ammonium	240 " "	55 "
*Metabisulphite of potassium.....	480 " "	110 "
Distilled water to make up (fluid)	10 ounces	1000 c. c.

Dissolve the metabisulphite in part of the water, then add the other ingredients, and make up to bulk with water.

A. Stock solution.....	300 minims or	62 c. c.
Distil. water to make up to (fluid)	10 ounces	1000 "
B. Liq. ammonia .880	70 minims or	14.5 "
Distil. water to make up to (fluid)	10 ounces	1000 "

Use equal parts of A and B mixed at time of developing.

Pyro-soda Developer.

A. Pyrogallic acid	60 grains or	14 grammes.
*Metabisulphite of potassium ...	15 " "	3.5 "
Distil. water to make up to (fluid)	10 ounces	1000 c. c.
B. Washing soda	600 grains or	137 grammes.
Sulphate of soda.....	800 " "	183 "
Distil. water to make up to (fluid)	10 ounces	1000 c. c.

Use equal parts of A and B mixed at time of developing.

To correct errors in exposure :—If under-exposed, use a larger proportion of B; if over-exposed, decrease the proportion of B, and add a few drops of a ten per cent. solution of bromide of potassium.

* Metabisulphite of potassium is unequalled as a preservative of pyrogallie acid in solution. If not at hand substitute, for each grain of metabisulphite, sulphuric acid $\frac{1}{2}$ minim *plus* sulphite of soda, $2\frac{1}{2}$ grains

Eikonogen Developer.

- | | | |
|--------------------------------------|----------------|--------------|
| A. Eikonogen | 100 grains or | 23 grammes. |
| Sulphite of soda (recrystd.) | 100 " " | 23 " |
| Distil. water to make up to (fluid) | 10 ounces " | 1000 c. c. |
| B. Carbonate of potassium (com.) ... | 1200 grains or | 274 grammes. |
| Sulphite of soda (recrystd.) | 500 " " | 114 " |
| Distil. water to make up to (fluid) | 10 ounces " | 1000 c. c. |

Use 3 parts of A to 1 part of B mixed at time of developing.

Hydroquinone Developer.

- | | | |
|-------------------------------------|--------------|-------------|
| A. Hydroquinone | 40 grains or | 9 grammes. |
| Metabisulphite of potassium..... | 40 " " | 9 " |
| Bromide of potassium..... | 5 " " | 1 gramme. |
| Distil. water to make up to (fluid) | 10 ounces " | 1000 c. c. |
| B. Caustic potass (sticks) | 80 grains or | 18 grammes. |
| Distil. water to make up to (fluid) | 10 ounces " | 1000 c. c. |

Use equal parts of A and B mixed at time of developing.

THE MAWSON PHOTO-MECHANICAL PLATE.

DEVELOPERS.

Pyro-ammonia Developer.

- | | | |
|-------------------------------------|--------------|------------|
| A. Pyrogallie acid | 30 grains or | 7 grammes. |
| Bromide of ammonium | 30 " " | 7 " |
| Metabisulphite of potassium | 30 " " | 7 " |
| Distil. water to make up to (fluid) | 10 ounces " | 1000 c. c. |
| B. Liq. ammoniæ 880 | 70 minims or | 14.6 c. c. |
| Distil. water to make up to (fluid) | 10 ounces " | 1000 " |

Use equal parts of A and B mixed at time of developing.

Hydroquinone Developer.

- | | | |
|-------------------------------------|--------------|-------------|
| A. Hydroquinone | 40 grains or | 9 grammes. |
| Bromide of potassium..... | 10 " " | 2 " |
| Metabisulphite of potassium..... | 40 " " | 9 " |
| Distil. water to make up to (fluid) | 10 ounces " | 1000 c. c. |
| B. Caustic potass (sticks) | 80 grains or | 18 grammes. |
| Distil. water to make up to (fluid) | 10 ounces " | 1000 c. c. |

Use equal parts of A and B mixed at time of developing.

THE MAWSON LANTERN PLATE.

Developers.

Exposure.—A negative of average density requires about 15 seconds at 1 foot from a No. 6 bat's-wing burner. Short exposure tends to produce black tones; long exposure, brown tones.

Either of the following developers may be used, though we give the preference to the pyro-ammonia, greater variety of tone being available by it.

Development begins rather slowly, especially with the hydroquinone formula, afterwards proceeding more rapidly.

Pyro-ammonia Developer.

- | | | |
|-------------------------------------|--------------|------------|
| A. Pyrogallie acid | 20 grains or | 5 grammes. |
| Bromide of ammonia..... | 20 " " | 5 " " |
| Metabisulphite of potassium ... | 50 " " | 11 " " |
| Distil. water to make up to (fluid) | 10 ounces | 1000 c.c. |
| B. Liq. ammoniæ 880 | 70 minims or | 15 c.c. |
| Distil. water to make up to (fluid) | 10 ounces | 1000 " |

Use equal parts of A and B mixed at time of developing.

Hydroquinone Developer.

- | | | |
|-------------------------------------|--------------|-------------|
| A. Hydroquinone..... | 40 grains or | 9 grammes. |
| Bromide of potassium | 40 " " | 9 " " |
| Metabisulphite of potassium ... | 40 " " | 9 " " |
| Distil. water to make up to (fluid) | 10 ounces | 1000 c.c. |
| B. Caustic potass (sticks)..... | 80 grains | 18 grammes. |
| Distil. water to make up to (fluid) | 10 ounces | 1000 c.c. |

Use equal parts of A and B mixed at time of developing.

Eikonogen Developer.

- | | | |
|-------------------------------------|---------------|--------------|
| A. Eikonogen | 100 grains or | 23 grammes. |
| Bromide of potassium | 20 " " | 4 6 " |
| Sulphite of sodium (recrystd.)... | 100 " " | 23 " |
| Distil. water to make up to (fluid) | 10 ounces | 1000 c.c. |
| B. Washing soda | 600 grains or | 137 grammes. |
| Distil. water to make up to (fluid) | 10 ounces | 1000 c.c. |

Use equal parts of A and B mixed at time of developing.

Ferrous-oxalate Developer.

- | | | |
|-------------------------------------|----------------|--------------|
| A. Neutral oxalate of potassium ... | 1200 grains or | 274 grammes. |
| Bromide of potassium | 5 " " | 1 " |
| Citric acid | 15 " " | 8 " |
| Distil. water to make up to (fluid) | 10 ounces | 1000 c.c. |
| *B. Ferrous sulphate | 1600 grains or | 365 grammes. |
| Citric acid | 120 " " | 27 " |
| Distil. water to make up to (fluid) | 10 ounces | 1000 c.c. |

Use 7 parts of A and 1 part of B, mixed at time of developing.

* Should this solution after keeping change to a brown colour, discard and mix afresh.

THE MAWSON OPAL PLATE.

Developer.

- A. Neutral oxalate of potassium..... 1200 grains or 274 grammes.
 Bromide of potassium 5 " " 1 "
 Citric acid 15 " " 3 "
 Distilled water to make up to (fluid) 10 ounces " 1000 c. c.
- . Ferrous sulphate 1600 grains or 365 grammes.
 Citric acid 120 " " 27 "
 Distilled water to make up to (fluid) 10 ounces " 1000 c. c.

Use 7 parts of A and 1 part of B, mixed at the time of developing.
 Should B, after keeping, change to a brown colour, discard and mix afresh.

THE MAWSON BROMIDE PAPER.

Developer.

- A. Neutral oxalate of potassium..... 1200 grains or 274 grammes.
 Bromide of potassium 5 " " 1 gramme.
 Citric acid 15 " " 3 grammes.
 Distilled water to make up to (fluid) 10 ounces " 1000 c. c.
- B. Ferrous sulphate 1600 grains or 365 grammes.
 Citric acid 120 " " 27 "
 Distilled water to make up to (fluid) 10 ounces " 1000 c. c.

Use 7 parts of A and 1 part of B, mixed at the time of developing.
 Should B, after keeping, change to a brown colour, discard, and mix afresh.

THE PAGET PRIZE PLATE COMPANY'S FORMULÆ.

PYRO-AMMONIA.

- No. 1. Pyrogallie acid 1 ounce or 50 grammes.
 Citric acid 60 grains " 7 "
 Sodium sulphite (pure) $2\frac{1}{2}$ ounces " 125 "
 Distilled water to make 20 " " 1000 c. c.
- No. 2. Liq. Ammonia '880 1 ounce or 50 c. c.
 Ammonium bromide..... 80 grains " 9 grammes.
 (For Phoenix plates, 120 grains or 14 grammes.)
 Distilled water to make 20 ounces or 1000 c. c.

One part of each to 10 parts of water.

PYRO SODA.

- No. 1. Pyrogallie acid..... $\frac{1}{4}$ ounce or 12.5 grammes.
 Sulphuric acid 5 drops " 0.5 c. c.
 Distilled water to make 20 ounces " 1000 "
- No. 2. Carbonate of soda (cryst. pure)... 2 ounces or 100 grammes
 Sulphite of soda (pure) 2 " " 100 "
 Distilled water to make 20 " " 1000 c. c.

Equal parts of each.

HYDROQUINONE.

No. 1. Hydroquinone	1 ounce or	50 grammes.
Methylated spirit.....	10 ounces „	500 c. c.
Sulphurous acid	$\frac{1}{2}$ ounce „	25 „
Potassium bromide	$\frac{1}{4}$ „ „	12 grammes.

Dissolve the hydroquinone in the spirit, and add the acid. In another vessel dissolve the potassium bromide in 3 ounces (150 c. c.) of distilled water. Mix the two solutions, and make up to 20 ounces (1000 c. c.) with distilled water.

No. 2. Caustic soda (in sticks)	1 ounce or	50 grammes.
Sodium sulphite	5 ounces „	250 „
Distilled water to make.....	20 „ „	1000 c. c.

One part of each to 4 parts of water.

If this be found to give too hard a negative, use more water.

EIKONOGEN.

No. 1. Eikonogen	$\frac{1}{2}$ ounce or	17 grammes.
Sodium sulphite	$1\frac{1}{2}$ „ „	50 „
Potassium bromide	8 grains „	0.6 gramme.
Distilled water to make.....	30 ounces „	1000 c. c.

Sixty grains (5 grammes) hydroquinone added to above is a decided improvement, increasing brilliancy and density.

No. 2. Potassium carbonate	1 ounce or	100 grammes.
Distilled water to make.....	10 ounces „	1000 „

Three parts of No. 1 to one part of No. 2.

DEVELOPMENT.

For BLACK TONES any of the following formulæ are suitable.

*Pyro Ammonia.**Solution No. 1.*

Pyrogallie acid.....	1 ounce or	100 grammes.
Sodium sulphite	$1\frac{1}{2}$ „ „	150 „
Citric acid.....	$\frac{1}{4}$ „ „	25 „
Distilled water to	10 ounces „	1000 c. c.

Solution No. 2.

Liquor ammoniæ, '880	1 ounce or	100 grammes.
Ammonium bromide	1 „ „	100 „
Distilled water to	10 ounces „	1000 „

For use, take 45 minims (4.7 c. c.) of each solution and make up with water to 2 ounces (100 c. c.).

*Ferrous-oxalate Developer.**Solution No. 1.*

Neutral oxalate of potash	16 ounces or	320 grammes.
Citric acid.....	60 grains „	3 „
Hot water	50 ounces „	1000 c. c.

Solution No. 2.

Protosulphate of iron	4 ounces or	500 grammes.
Citric acid	15 grains	" 4 "
Hot water	8 ounces	" 1000 c. c.

Solution No. 8.

Bromide of potassium	$\frac{1}{4}$ ounce or	25 grammes.
Water	10 ounces	" 1000 c. c.

For development, take 6 ounces (60 c. c.) of No. 1 and add 1 ounce (10 c. c.) of No. 2 and 21 drops ($\frac{1}{2}$ c. c.) of No. 8. Gives cold black tones.

*Eikonogen Developer.**Solution No. 1.*

Eikonogen	$\frac{1}{8}$ ounce or	17 grammes.
Sodium sulphite.....	$1\frac{1}{2}$ " "	50 "
Potassium bromide	8 grains	" 0.4 "
Distilled water to	30 ounces	" 1000 c. c.

Solution No. 2.

Potassium carbonate	1 ounce or	100 grammes.
Distilled water to	10 ounces	" 1000 c. c.

Take three parts of No. 1 to one part of No. 2 solution.

Rodinal Developer.

Rodinal concentrated solution	1 part or	33 c. c.
Water	30 parts	" 1000 "

This is a very clean developer, and gives a rich black colour.

*Hydroquinone.**Solution No. 1.*

Hydroquinone	$\frac{1}{2}$ ounce or	25 grammes.
Sulphurous acid.....	$\frac{1}{4}$ " "	12.5 c. c.
Potassium bromide	60 grains	" 7 grammes.
Water to	20 ounces	" 1000 c. c.

Solution No. 2.

Caustic soda	$\frac{1}{2}$ ounce or	25 grammes.
Sodium sulphite.....	$2\frac{1}{2}$ ounces	" 125 "
Water to	20 " "	" 1000 c. c.

For use, take $\frac{1}{2}$ ounce (50 c. c.) of each to 1 ounce (100 c. c.) of water.

WARM TONES.—DEVELOPER.

Solution No. 1.

Hydroquinone	$\frac{1}{2}$ ounce or	25 grammes.
Sulphurous acid.....	$\frac{1}{4}$ " "	12.5
Potassium bromide	60 grains	" 7
Water to	20 ounces	" 1000 c. c.

Solution No.

Caustic soda.....	$\frac{1}{2}$ ounce or	25 grammes.
Sodium sulphite	$2\frac{1}{2}$ ounces „	125 „
Water to	20 „ „	1000 c. c.

Solution No. 3.

Bromide of ammonium	1 ounce or	50 grammes.
Carbonate of ammonium	1 „ „	50 „
Water to	20 ounces „	1000 c. c.

Brown.

Exposure: 60 seconds 1 foot from gas-flame, or 2 inches of magnesium wire burnt at a distance of 3 feet. Developer: solution 1, $\frac{1}{2}$ ounce (50 c. c.); solution 2, $\frac{1}{2}$ ounce (50 c. c.); solution 3, 100 minims (20 c. c.); water to 2 ounces (200 c. c.). Time required in development, about 5 minutes.

Purple brown.

Exposure: 90 seconds 1 foot from gas-flame, or 3 inches of magnesium wire burnt at a distance of 3 feet. Developer: solution 1, $\frac{1}{2}$ ounce (50 c. c.); solution 2, $\frac{1}{2}$ ounce (50 c. c.); solution 3, 200 minims (40 c. c.); water to 2 ounces (200 c. c.). Time required in development, about 10 minutes.

Purple.

Exposure: 3 minutes 1 foot from gas-flame, or 3 inches of magnesium wire burnt at a distance of 2 feet. Developer: solution 1, $\frac{1}{2}$ ounce (50 c. c.); solution 2, $\frac{1}{2}$ ounce (50 c. c.); solution 3, 250 minims (50 c. c.); water to 2 ounces (200 c. c.). Time required in development, about 12 minutes.

Red.

Exposure: 5 minutes 1 foot from gas-flame, or 5 inches of magnesium wire burnt at a distance of 2 feet. Developer: solution 1, $\frac{1}{2}$ ounce (50 c. c.); solution 2, $\frac{1}{2}$ ounce (50 c. c.); solution 3, 300 minims (60 c. c.); water to 2 ounces. Time required in development, about 15 minutes.

PRINTING-OUT OPALS AND LANTERN PLATES.

*Combined Toning and Fixing Bath.**No. 1 Stock.*

Hypo-sulphite of soda.....	20 ounces or	125 grammes.
Alum (potash alum only)	5 „ „	31 „
Sodium sulphate (not sulphite)	14 „ „	88 „
Water to.....	1 gallon „	1000 c. c.

Dissolve the hypo and alum each in about one quart (250 c. c.) of hot water, mix, and then add sodium sulphate already dissolved, making up to one gallon with remainder of water. This mixture should then be left for some hours for the precipitate to settle, when the clear solution may be poured off or filtered, and is then ready for use. It will keep indefinitely.

No. 2 Stock.

Gold chloride	15 grains or	4 grammes.
Acetate of lead	64 " "	18 " "
Water (distilled)	8 ounces	1000 c. c.

Dissolve the acetate of lead in the water, and add the gold. A heavy precipitate forms in this solution, which should be shaken up when any is to be poured out: it redissolves when added to No. 1 stock solution. For use: Mix 8 oz. of No. 1 with 1 oz. of No. 2. When this bath is used, the prints should *not* be washed *before* toning.

Separate Toning Bath.

Sulphocyanide of ammonium ...	30 grains or	4 grammes.
Gold chloride	2½ " "	04 " "
Water	16 ounces	1000 c. c.

BROMIDE OPALS.

Development.

For black tones the following developer is the one chiefly used:—

*Ferrous-oxalate Developer.**Solution 1.*

Neutral oxalate of potash	16 ounces or	320 grammes.
Citric acid	60 grains	3 " "
Hot water	50 ounces	1000 c. c.

Solution 2.

Protosulphate of iron	4 ounces or	500 grammes.
Citric acid	½ ounce	31 " "
(Or acetic acid, ½ drachm or 8 c. c.)		
Hot water	8 ounces	1000 c. c.

Solution 3.

Bromide of potassium	½ ounce or	25 grammes.
Water	10 ounces	1000 c. c.

For development take (when cold) 6 ounces (600 c. c.) of No. 1, and add 1 ounce (100 c. c.) of No. 2 and ½ drachm (6 c. c.) of No. 3.

For warm black tones use the hydroquinone developer, made up as follows:—

*Hydroquinone Developer.**Solution 1.*

Hydroquinone	½ ounce or	10 grammes.
Sulphurous acid	¼ " "	5 " "
Potassium bromide	60 grains	3 " "
Water to	50 ounces	1000 c. c.

Water

For use take equal parts of the two solutions. By increasing the exposure and using less of No. 1 solution, still browner images can be obtained. Other developers, such as eikonogen, pyro, rodinal, &c., can also be used.

ROUCH'S FORMULÆ.

A. Pyrogallic acid	1 ounce or 100 grammes.
Sulphite of soda	4 ounces „ 400 „
Water, to make	10 „ „ 1000 c. c.

Dissolve the sulphite of soda in hot water, and, when cold, add the pyrogallic acid. Should any portion of the sulphite refuse to dissolve, the crystals may be allowed to remain in the bottle.

B. Bromide of ammonium	1 ounce or 100 grammes.
Water, to make	10 ounces „ 1000 c. c.
C. Strongest liquor ammoniæ... ..	3 ounces or 300 c. c.
Water, to make	10 „ „ 1000 „

In case sulphite of soda be not readily obtainable, the following may be substituted for solution A as above, and used in the same manner:—

Pyrogallic acid.....	1 ounce or 100 grammes.
Citric acid.....	50 grains „ 11 „
Water, to make	10 ounces „ 1000 c. c.

Dissolve the citric acid first, and then add the pyro.

THE SANDELL WORKS COMPANY'S FORMULÆ.**PYRO POTASH.**

No. 1. Pyro.....	1 ounce or 28 grammes.
Sulphite soda.....	3 ounces „ 85 „
Bromide potassium	3 „ „ 21 „
Citric acid	60 grains „ 4 „
Boiled or distilled water to.....	10 ounces „ 300 c. c.
No. 2. Carbonate potash	2 ounces or 56 grammes.
Sulphite soda	2 „ „ 85
Boiled or distilled water to.....	10 „ „ 300 „

HYDROQUINONE METOL.

(For Black Tones.)

No. 1. Hydr. quinone	200 grains or 13 grammes.
Metol.....	20 ounces „ 15 „
Sulphite soda	3 „ „ 85 „
Bromide potassium.....	30 grains „ 2 „
Citric acid.....	30 „ „ 2 „
Boiled or distilled water to ...	20 ounces „ 600 c. c.
No. 2. Carbonate soda crystals.....	2 ounces or 56 grammes.
Caustic soda	60 grains „ 4 „
Boiled or distilled water to ...	20 ounces „ 600 c. c.

METOL.

- No. 1. Metol 120 grains or 8 grammes.
 Sulphite soda 2 ounces „ 56 „
 Bromide potassium 129 grains „ 8 „
 Boiled or distilled water to 20 ounces „ 600 c. c.
- No. 2. Carbonate soda crystals 2 ounces or 56 grammes.
 Boiled or distilled water to 20 „ „ 600 c. c.

PYRO AMMONIA.

(For Warm Tones.)

- No. 1. Pyro 1 ounce or 28 grammes.
 Sulphite soda 3 ounces „ 85 „
 Citric acid 120 grains „ 8 „
 Boiled or distilled water to 10 ounces „ 300 c. c.
- No. 2. Liquid ammonia, 880 1 ounce or 30 c. c.
 Boiled or distilled water to 10 ounces „ 300 „
- No. 3. Bromide ammonium 1 ounce or 28 grammes.
 Boiled or distilled water to 10 ounces „ 300 c. c.

THOMAS'S FORMULÆ.

LANTERN OR TRANSPARENCY PLATES.

Developing Formula.

Black Tones.

- No. 1. Hydroquinone 160 grains or 10 grammes.
 Sodium sulphite 4 ounces „ 110 „
 Citric acid 60 grains „ 4 „
 Potassium bromide 160 „ „ 10 „
 Water to 20 ounces „ 560 c. c.
- No. 2. Sodium hydrate 160 grains or 10 grammes.
 Water to 20 ounces „ 560 c. c.

Take equal parts of each solution, and development should be completed in three to four minutes. The plates should be somewhat over-developed, as they lose density in fixing.

Cold Tones.

- No. 1. Pyrogallie acid 1 ounce or 28 grammes.
 Metabisulphite of soda 1 „ „ 28 „
 Water to 100 ounces „ 2830 c. c.
- No. 2. Washing soda 6 ounces or 170 grammes.
 Potassium bromide 20 grains „ 1.3 „
 Water to 100 ounces „ 2830 c. c.

Take equal parts of each solution, and development should be completed in five to seven minutes. Slightly over-develop to allow for loss in fixing.

Purple Tones.

No. 1. Pyrogallic acid.....	1 ounce or	28 grammes.
Metabisulphite of soda	1 " "	28 "
Water to	80 ounces	2250 c. c.
No. 2. Ammonium bromide	8 ounces or	225 grammes.
Liq. ammoniæ ·880	4 " "	110 c. c.
Water to	80 " "	2250 "

Use equal parts of each solution.

This developer allows great latitude in exposure, and takes from three to twelve minutes to develop, according to the amount of exposure given.

When using this developer, the image will appear buried and lacking in density if examined by ruby light, but, when fixed, will be fully dense, and the deposit will appear opaque by reflected light, and purple by transmitted light, improving in colour when dry.

Fixing Bath.

Hyposulphite of soda.....	4 ounces or	110 grammes.
Ten per cent. solution of metabisulphite of soda ...	1 ounce	28 c. c.
Water to	20 ounces	560 "

PYRO AND SODA DEVELOPER.

No. 1. Pyrogallic acid.....	1 ounce or	12·5 grammes.
Metabisulphite of soda	1 " "	12·5 "
Water to	80 ounces	1000 c. c.
No. 2. Carbonate of soda (washing soda)	6 ounces or	75 grammes.
Water.....	80 " "	1000 c. c.

For use, take equal parts of Nos. 1 and 2. For full exposure and in hot weather, 2 to 5 drops of a ten per cent. solution of potassium bromide may be added to each ounce. For under-exposure and isochromatic emulsions, this developer may be still further diluted.

Fixing Bath.

Hyposulphite of soda.....	1 pound or	200 grammes.
Water to make.....	80 ounces	1000 c. c.

WRATTEN & WAINWRIGHT'S FORMULÆ.

DEVELOPING FORMULÆ.

Ten per cent. Pyro and Ammonia.

- A. Liquor ammoniæ 1 ounce or 100 c. c.
 B. Oxide potassium 110 grains „ 22 grammes.
 Water 10 ounces „ 1000 c. c.
- B. Pyro 1 ounce or 100 grammes.
 { Citric acid 60 grains „ 12 „
 { Or sulphuric acid $\frac{1}{2}$ drachm „ 6 c. c.
 Water 10 ounces „ 1000 „

For Instatane use an Ordinary cake from 60 (3 c. c.) to 90 minims (5 c. c.) and for Drop Shutter 90 minims (5 c. c.) of Solution B, dilute with from 2 to 4 ounces (60 to 120 c. c.) of water, and add 100 minims (6 c. c.) of Solution A.

It is better to add Solution A by instalments as development proceeds, unless the exposure is known to be either insufficient or quite accurate, in which cases it may be in one quantity.

The addition of 2 ounces (200 grammes) sulphite of soda to Solution B retards discoloration and improves the tone of the negative, but slightly prolongs the operation of development.

PYRO SODA.

We recommend this developer for studio and hand-camera work.

- No. 1. Sulphite soda 6 ounces or 75 grammes.
 Water 80 „ „ 1000 c. c.
 Sulphuric acid or citric acid 1 drachm „ 15 „
 Pyro 1 ounce „ 13 grammes.
- No. 2. Soda carbonate 6 ounces or 75 grammes.
 Water 80 „ „ 1000 c. c.

For use, take equal parts of Nos. 1 and 2.

The best printing results in hand camera work may be obtained by developing with the above developer or the pyro acetone, and diluting with from 1 to $1\frac{1}{2}$ times its bulk with water. Time from 10 to 20 minutes; without dilution, 3 to 5 minutes.

METOL.

- A. Metol 50 grains or 10 grammes.
 Water 10 ounces „ 1000 c. c.
 When dissolved, add
 Soda sulphite 1 ounce „ 100 grammes.
- B. { Soda carbonate 2 ounces or 200 grammes.
 { Or potass, carbonate 1 ounce „ 100 „
 Water 10 ounces „ 1000 c. c.

C. Ten per cent. Potass. Bromide Solution.

Potass. bromide 1 ounce or 100 grammes.

Water 10 ounces „ 1000 c.c.

Mix 3 parts A with 1 part B, dilute with an equal bulk of water, and add 20 minims (1·5 c. c.) ten per cent. bromide solution C.

If more density and contrast be required, use the solution more concentrated, dilution giving softness according to its degree.

PYRO ACETONE.

No. 1.—Same as pyro soda No. 1.

No. 2.—Acetone, 10 ounces or 250 c. c.; water, 40 ounces or 1000 c. c.

For use, take equal parts Nos. 1 and 2; or, for more contrast, No. 1, 2 parts; No. 2, 1 part.

For over-exposure add ten per cent. bromide solution from 5 minims (3 c. c.) upwards according to necessity.

For use with the London Drop shutter Special always add 5 minims (3 c. c.) of ten per cent. bromide solution *before* application.

This developer gives reddish-brown tones, is controllable by the addition of bromide, produces a good even printing density, and is excellent for under-exposure.

The total time of development is about the same as with pyro soda, although the image makes a quicker appearance.

It does not soil the hands.

Rodinal used in the proportion of 1 to 25 yields brilliant results, its applicability is very comprehensive, suiting nearly all subjects.

Temperature of water and solutions should be about 60° F. or 15 C.

Fixing.—Either a plain A or an acid B fixing bath may be used, giving a brown or a blackish tint respectively after pyro-ammonia development.

A. Hyposulphite soda..... 4 ounces or 200 grammes.

Water 20 „ „ 1000 c. c.

B. Hyposulphite soda..... 5 ounces or 250 grammes.

Water 20 „ „ 1000 c. c.

Sulphite soda 1 ounce „ 50 grammes.

When dissolved, add slowly, stirring all the time,

Sulphuric acid..... 1 drachm or 6 c. c.

Formalin will be found very useful during hot or thundery weather in preventing decomposition during prolonged washing, and should be used according to maker's directions.

N.B.—The equivalents of English and French measures above given are approximate.

DEVELOPING VALUE OF THE ALKALIES.

THE LATE W. B. BOLTON'S TABLE.

Caustic Soda.	Caustic Potash.	Ammonia NH_3 .	Carbonate of Soda (anhydrous).	Carbonate of Soda (cryst.).	Carbonate of Potash (anhydrous).	Carbonate of Potash (cryst.).	Sesquicarbonate of Ammonia.
1	1.400	0.425	2.650	7.150	3.450	4.350	7.250
0.714	1.	0.304	1.893	5.170	2.464	3.107	5.178
2.353	3.294	1.	6.235	16.823	8.117	10.235	17.057
0.377	0.528	0.160	1.	2.698	1.301	1.641	2.736
0.140	0.196	0.059	0.370	1.	0.482	0.608	1.014
0.290	0.405	0.123	0.768	2.072	1.	1.261	2.101
0.230	0.322	0.098	0.603	1.644	0.793	1.	1.666
0.188	0.193	0.059	0.265	0.986	0.476	0.600	1.

CHEMICAL EQUIVALENCE OF THE ALKALIES.

MR. G. E. BROWN'S TABLE.

Caustic Soda.	Caustic Potash.	Ammonia (380 solution).	Carbonate of Soda (anhydrous).	Carbonate of Soda (cryst.).	Carbonate of Potash (anhydrous).	Carbonate of Potash (cryst.).	Sesquicarbonate of Ammonia.
80	112	97.14	106	286	138	174	127
1	1.400	.867	1.325	3.575	1.725	2.174	1.587
.714	1	1.211	.946	2.553	1.232	1.554	1.134
.834	1.153	1	1.091	2.944	1.421	1.791	1.307
.755	1.033	.916	1	2.698	1.302	1.641	1.198
.280	.392	.340	.371	1	.483	.608	.444
.580	.812	.704	.768	2.072	1	1.260	.920
.460	.644	.558	.609	1.644	.793	1	.730
.630	.882	.765	.835	2.252	1.087	1.370	1

TABLES FOR THE SIMPLIFICATION OF EMULSION CALCULATIONS.

WITH a view of simplifying the calculations involved in emulsion-making, the late Mr. William Ackland a few years ago worked out some useful tables, which will enable even those most ignorant of chemical philosophy to calculate with ease and rapidly the proper quantities of silver or haloid salts in any formula. Even those who are able to perform the calculations in the recognised style will find their labours materially lightened by means of these tables, which should be kept in a convenient place for reference in every laboratory.

No. I.

	Equiva- lent- weights.	Weight of AgNO ₃ required to con- vert one grain of soluble haloid.	Weight of soluble haloid required to con- vert one grain AgNO ₃ .	Weight of silver haloid pro- duced by one grain of soluble haloid.	Weight of soluble haloid required to pro- duce one grain of silver haloid.	Weight of silver haloid pro- duced from one grain AgNO ₃ .
Ammonium bromide	98	1.734	.576	1.918	.521	1.106
Potassium "	119.1	1.427	.700	1.578	.633	
Sodium "	103	1.650	.606	1.825	.548	
Cadmium " com.	172	.988	1.012	1.093	.915	
" " anh.	136	1.25	.800	1.382	.723	
Zinc "	112.1	1.509	.663	1.670	.600	.844
Ammonium chloride	53.5	3.177	.315	2.682	.373	
Sodium "	58.5	2.906	.344	2.453	.408	
Ammonium iodide	145	1.172	.853	1.620	.617	1.382
Potassium "	166.1	1.023	.977	1.415	.707	
Sodium "	150	1.133	.882	1.566	.638	
Cadmium "	183	.929	1.076	1.234	.778	

The principal bromides, chlorides, and iodides which are likely to be used in emulsions of either gelatine or collodion have been included in these tables. Table No. I. presents to the reader, without any mystification which may be involved in equivalents, the actual weights of haloid or silver, as the case may be, required to convert or combine with one grain of the other.

In order to test the utility of this table, let us suppose that it is desired to make (say) ten ounces of emulsion by a new formula, which, for the sake of showing the working of the table, we will write down as follows:—

Bromide of potassium.....	150 grains.
Iodide of potassium.....	10 "
Chloride of ammonium	10 "
Gelatine	200 "

Now we want to know how much silver nitrate should be employed in sensitising this mixture. For this purpose we use the first column, in which we find against each haloid the exact quantity of silver nitrate required to fully decompose one grain. Taking, then, the figures we find in column No. 1 against the three salts in the above formula, and multiplying them by the number of grains of each used, we have the following sum:—

Potassium bromide.....	$150 \times 1.427 = 214$	Weight of silver nitrate required,
" iodide.....	$10 \times 1.023 = 10.23$	
Chloride of ammonium ...	$10 \times 3.177 = 31.77$	

or the total quantity of silver nitrate required for full conversion, 256.00 grains.

No. II.

	A. Bromide.	Potassium Bromide.	Sodium Bromide.	Cadmium Bromide. (Coml.)	Cadmium Bromide. (Anhyd.)	Zinc Bromide.	Ammonium Chloride.	Sodium Chloride.	Ammonium Iodide.	Potassium Iodide.	Sodium Iodide.	Cadmium Iodide.
Ammonium bromide	1	.823	.951	.57	.72	.87	1.832	1.675	.676	.59	.653	.535
Potassium "	1.215	1	1.156	.692	.876	1.058	2.226	2.036	.821	.717	.794	.651
Sodium "	1.051	.865	1	.599	.757	.915	1.925	1.761	.71	.62	.686	.563
Cadmium "	1.755	1.444	1.67	1	1.265	1.527	3.215	2.94	1.186	1.035	1.146	.94
"	1.387	1.141	1.32	.79	1	1.207	2.542	2.324	.938	.819	.906	.743
Zinc "	1.149	.945	1.093	.655	.823	1	2.104	1.925	.776	.678	.75	.615
Ammonium chloride .....	.546	.449	.519	.311	.393	.475	1	.914	.369	.322	.356	.292
Sodium "	.597	.491	.568	.34	.43	.519	1.093	1	.403	.352	.39	.319
Ammonium iodide	1.479	1.217	1.408	.843	1.066	1.287	2.712	2.478	1	.873	.966	.792
Potassium "	1.695	1.394	1.612	.965	1.221	1.475	3.104	2.839	1.145	1	1.107	.907
Sodium "	1.53	1.259	1.456	.872	1.103	1.332	2.803	2.584	1.034	.903	1	.819
Cadmium "	1.867	1.536	1.776	.064	1.345	1.625	3.42	3.128	1.262	1.102	1.22	1

TABLE No. II. gives in separate columns the relative converting values of each of the soluble haloid salts in ordinary use, showing how much of any salt must be used to replace one grain of any other. In each column will be found a unit (printed in larger type) which represents one grain of the salt named at the head of the column; the other figures in the same column show the exact quantities of the other salts which must be used in lieu of a single grain of that particular haloid. Thus, taking the first column, which is headed "Ammonium Bromide," we find against ammonium bromide in the margin the figure 1, representing one grain of that salt. If we wish to know the relative converting power of potassium bromide we take the number in the same column which stands against the latter salt in the margin, viz., 1.215; that is to say, 1.215 grain of potassium bromide will be required to do the same work as one of NH_4Br .

COMPARISON OF THE SILVER HALOIDS,
By E. VALENTA.

In the *Royal Photographic Society's Journal* the following table, the result of a series of experiments, was given.

Solvent.	Concentration.	100 g. of solution can dissolve in grammes.			Remarks.
		Ag Cl.	Ag Br.	Ag I.	
Sodium hyposulphite	1 : 100	0.40	0.35	0.03	The estimations were made at 20° C.
"	5 : 100	2.00	1.90	0.15	
"	10 : 100	4.10	3.50	0.30	
"	15 : 100	5.50	4.20	0.40	
"	20 : 100	6.10	5.80	0.60	
Ammonium hyposulphite	1 : 100	0.57	—	—	For bromide and iodide of silver similar results were obtained as with sodium hyposulphite.
"	5 : 100	1.32	—	—	
"	10 : 100	3.92	—	—	
"	10 : 100	0.44	0.04	0.01	
"	20 : 100	0.95	0.08	0.02	
Sodium sulphite	10 : 100	—	traces	—	
Ammonium sulphite	10 : 100	0.05	—	—	
Ammonium carbonate	10 : 100	1.40	—	—	
Ammonia	3°/°	7.58	—	—	
"	15°/°	0.50	—	—	
Magnesium chloride	50 : 100	2.75	6.55	8.23	25° C.
Potassium cyanide	5 : 100	0.08	0.21	0.02	23° C.
Ammonium sulphocyanide	10 : 100	0.54	2.04	0.08	
"	15 : 100	2.88	5.30	0.13	
"	10 : 100	0.11	0.73	—	25° C.
Potassium sulphocyanide	10 : 100	0.15	0.53	0.03	25° C.
Calcium sulphocyanide	10 : 100	0.20	0.35	0.02	
Barium sulphocyanide	10 : 100	2.02	4.50	0.02	
Aluminium sulphocyanide	10 : 100	0.83	1.87	0.79	
Thiocarbamide	1 : 100	0.40	0.08	0.008	
Thiosinamin	5 : 100	1.90	0.35	0.05	
"	10 : 100	3.90	0.72	0.09	

A TABLE OF ATOMIC WEIGHTS OF SEVENTY-FOUR ELEMENTS.

By T. W. RICHARDS,

From the "American Chemical Journal."

NAME.	Symbol.	Atomic Weight.
Aluminium.....	Al	27.1
Antimony	Sb	120.0
Argon	A	39.92
Arsenic	As	75.0
Barium	Ba	137.43
Beryllium	Be=Gl	9.1
Bismuth	Bi	208.0
Boron	B	10.95
Bromine	Br	79.955
Cadmium	Cd	112.3
Cæsium	Cs	132.9
Calcium	Ca	40.0
Carbon	C	12.001
Cerium	Ce	140.0
Chlorine	Cl	35.455
Chromium	Cr	52.14
Cobalt.....	Co	59.00
Columbium	Cb=Nb	94.0
Copper	Cu	63.60
"Didymium"	Nd + Pr	142 +
Erbium	Er	166.0
Fluorine	F	19.05
Gadolinium	Gd	156.0?
Gallium	Ga	70.0
Germanium	Ge	72.5
Glucinum	Gl=Be	9.1
Gold	Au	197.3
Helium	He	4.0?
Hydrogen	H	1.0075
Indium	In	114.0
Iodine.....	I	126.85
Iridium	Ir	193.0
Iron.....	Fe	56.0
Lanthanum	La	138.5
Lead	Pb	206.92
Lithium	Li	7.03
Magnesium	Mg	24.86
Manganese.....	Mn	55.02
Mercury	Hg	200.0

A TABLE OF ATOMIC WEIGHTS—CONTINUED.

NAME.	Symbol.	Atomic Weight.
Molybdenum	Mo	96.0
Neodymium	Nd	143.6
Nickel	Ni	58.70
Niobium	Nb = Cb	94.0
Nitrogen	N	14.045
Osmium	Os	190.8
Oxygen (Standard)	O	16.000
Palladium	Pd	106.5
Phosphorus	P	31.0
Platinum	Pt	195.2
Potassium	K	39.140
Praseodymium	Pr	140.5
Rhodium	Rh	103.0
Rubidium	Rb	85.44
Ruthenium	Ru	101.7
Samarium	Sm	150.0
Scandium	Sc	44.0
Selenium	Se	79.0
Silicon	Si	28.4
Silver	Ag	107.93
Sodium	Na	23.050
Strontium	Sr	87.68
Sulphur	S	32.065
Tantalum	Ta	183.0
Tellurium	Te	127.5
Terbium	Tb	160.0
Thallium	Tl	204.15
Thorium	Th	233.0
Thulium	Tu	170.0 ?
Tin	Sn	119.0
Titanium	Ti	48.17
Tungsten	W	184.4
Uranium	U	240.0
Vanadium	V	51.4
Ytterbium	Yb	173.0
Yttrium	Yt	89.0
Zinc	Zn	65.40
Zirconium	Zr	90.5

TABLE OF SYMBOLS AND EQUIVALENT WEIGHTS OF THE MORE IMPORTANT COMPOUNDS USED IN PHOTOGRAPHY.

NAME.	SYMBOL.	
Acetone	$\text{CH}_3 \text{ CO } \text{CH}_3$	58
Acid, Acetic	$\text{CH}_3 \text{ COOH}$	60
„ Boracic	$\text{H}_3 \text{ BO}_3$	62
„ Citric	$\text{C}_6 \text{ H}_8 \text{ O}_7 + \text{Aq}$	210
„ Formic	H COOH	46
„ Gallic	$\text{C}_6 \text{ H}_2 (\text{OH})_3 \text{ COOH}$	188
„ Hydriodic	HI	128
„ Hydrobromic	H Br	81
„ Hydrochloric	H Cl	36.5
„ Hydrocyanic	H CN	27
„ Hydrosulphuric	$\text{H}_2 \text{ S}$	34
„ Nitric	H NO_3	63
„ Oxalic	$(\text{COOH})_2 + 2 \text{ Aq}$	126
„ Pyrogallie	$\text{C}_6 \text{ H}_3 (\text{OH})_3$	126
„ Sulphuric	$\text{H}_2 \text{ SO}_4$	98
„ Sulphurous	$\text{H}_2 \text{ SO}_3$	82
„ Tannic	$\text{C}_{14} \text{ H}_{10} \text{ O}_9$	322
„ Tartaric	$\text{C}_2 \text{ H}_2 \text{ OH}_2 \text{ COH}$	133
Alcohol (Methyl)	$\text{CH}_3 \text{ OH}$	32
„ (Ethyl)	$\text{C}_2 \text{ H}_5 \text{ OH}$	46
Alum (Chrome)	$\text{K Cr } (\text{SO}_4)_2 \cdot 12 \text{ Aq}$	499.3
„ Potash	$\text{K Al } (\text{SO}_4)_2 + 12 \text{ Aq}$	474.5
Amidol	$\text{C}_6 \text{ H}_3 \text{ OH } (\text{NH}_2)_2 (\text{H Cl})_2$	196
Ammonium, Bichromate	$(\text{NH}_4)_2 \text{ Cr}_2 \text{ O}_7$	53
„ Bromide	$\text{NH}_4 \text{ Br}$	298
„ Chloride	$\text{NH}_4 \text{ Cl}$	53.5
„ Iodide	$\text{NH}_4 \text{ I}$	145
„ Nitrate	$\text{NH}_4 \text{ NO}_3$	80
„ Oxalate	$(\text{H}_4)_2 \text{ C O}_4$	124
„ Sulphide	$\text{NH}_4 \text{ HS}$	51
„ Sulphocyanide	$\text{NH}_4 \text{ CNS}$	76
Barium, Bromide	$\text{Ba Br}_2 + 2 \text{ Aq}$	333
„ Chloride	$\text{Ba Cl}_2 + 2 \text{ Aq}$	244
„ Iodide	$\text{Ba I}_2 + 2 \text{ Aq}$	427
„ Nitrate	$\text{Ba}_2 (\text{NO}_3)_2$	261
Benzole	$\text{C}_6 \text{ H}_6$	78
Cadmium, Bromide	$\text{Cd Br}_2 + 4 \text{ Aq}$	344
„ Chloride	$\text{Cd Cl}_2 + 2 \text{ Aq}$	219
„ Iodide	Cd I_2	366
Calcium, Bromide (ryst.)	$\text{Ca Br}_2 + 4 \text{ Aq}$	272
„ Chloride (Cryst.)	$\text{Ca C } + 6 \text{ Aq}$	219
„ Iodide	Ca I_2	294
Copper, Bromide	Cu Br_2	223.5
„ Chloride	$\text{Cu Cl}_2 + 2 \text{ Aq}$	170.5
„ Sulphate	$\text{Cu SO } + 5 \text{ Aq}$	249.5

TABLES OF SYMBOLS, &c.—CONTINUED.

NAME.	SYMBOL.
Eikonogen	$C_{10}H_5OH(NH_2)_2(HCl)_2$... 247
Formaline	$HCHO$ 30
Glycerine	$C_3H_5(OH)_3$ 92
Gold, Chloride	$AuCl_3 + 2Aq$ 339.2
Hydroquinone	$C_6H_4(OH)_2$ 110
Iridium, Perchloride.....	$IrCl_4$ 335
Iron, Chloride (ferrous)	$FeCl_2 + 4Aq$ 199
" " (ferric)	Fe_2Cl_6 325
" Citrate	$Fe_2(C_6H_5O_7)_2$ 598
" Iodide	$FeI_2 + 4Aq$ 382
" Oxalate (ferrous)	FeC_2O_4 144
" " (ferric)	$Fe_2C_2O_4$ 376
" Sulphate (ferrous)	$FeSO_4 + 7Aq$ 278
" " (ferric)	$Fe_2(SO_4)_3$ 400
" Ammonia-sulphate.....	$FeSO_4(NH_4)_2SO_4 + 6Aq$... 392
Lead, Acetate	$Pb(C_2H_3O_2)_2 + 3Aq$ 379
" Nitrate.....	$Pb(NO_3)_2$ 331
Lithium, Bromide.....	$LiBr$ 87
" Chloride.....	$LiCl$ 42.5
" Iodide	LiI 134
Magnesium, Bromide	$MgBr_2$ 184
" Chloride	$MgCl_2 + 6Aq$ 203
" Iodide	MgI_2 278
Mercury, Chloride (Mercuric)	$HgCl_2$ 271
Metol	$C_6H_4OHCH_3NH(H_2SO_4)_2$ 349
Para amidophenol.....	$C_6H_4OHNH_2HCl$ 145
Platinum, Chloride (Platinic)	$PtCl_4 + 8Aq$ 483.4
" " (Platinous).....	$PtCl_2$ 268.4
Potassium, Acetate	$K_2C_2H_3O_2$ 137
" Bichromate	$K_2Cr_2O_7$ 295
" Bromide.....	KBr 119.1
" Carbonate	$K_2CO_3 + 2Aq$ 174
" Chlorate	$KClO_3$ 122.5
" Chloride.....	KCl 74.5
" Citrate	$K_3C_6H_5O_7 + Aq$ 324.3
" Cyanide	KCN 65
" Ferridcyanide	$K_6Fe_2Cy_{12}$ 658
" Ferrocyanide.....	$K_4FeCy_6 + 3Aq$ 422
" Hydrate	KOH 56.1
" Iodide	KI 166
" Nitrate	KNO_3 101
" Oxalate	$K_2C_2O_4 + Aq$ 235
" Permanganate	$K_2Mn_2O_8$ 316
" Platino-chloride	(K_2PtCl_4) 342.1
" Sulphocyanide	$KCyS$ 97
Silver, Acetate	$AgC_2H_3O_2$ 167
" Bromide	$AgBr$ 188

TABLES OF SYMBOLS, &c.—CONTINUED.

NAME.	SYMBOL.	
Silver, Carbonate	Ag_2CO_3	276
" Chloride	AgCl	143.5
" Citrate	$\text{Ag}_3\text{C}_6\text{H}_5\text{O}_7$	513
" Fluoride	AgF	127
" Iodide	AgI	235
" Nitrate	AgNO_3	170
" Oxalate	$\text{Ag}_2\text{C}_2\text{O}_4$	304
" Oxide	Ag_2O	232
" Sulphide	Ag_2S	248
Sodium, Acetate	$\text{NaC}_2\text{H}_3\text{O}_2 + 3\text{Aq}$	136
" Biborate (Borax)	$\text{Na}_2\text{B}_4\text{O}_7 + 10\text{Aq}$	382
" Bichromate	$\text{Na}_2\text{Cr}_2\text{O}_7 + 2\text{Aq}$	299
" Bromide	$\text{NaBr} + 4\text{Aq}$	175
" Carbonate (Cryst.)	$\text{Na}_2\text{CO}_3 + 10\text{Aq}$	286
" Chloride	NaCl	58.5
" Hydrate	NaHO	40
" Hyposulphite (Cryst.)	$\text{Na}_2\text{S}_2\text{O}_3 + 5\text{Aq}$	248
" Iodide	$\text{NaI} + 4\text{Aq}$	222
" Sulphite	$\text{Na}_2\text{SO}_3 + 7\text{Aq}$	252
Strontium, Bromide	SrBr_2	247.5
" Chloride	SrCl_2	158.5
" Iodide	SrI_2	341.5
Tin, Chloride (Stannous)	$\text{SnCl}_2 + 2\text{Aq}$	225
" " Stannic	SnCl_4	260
Uranium, Bromide	$\text{UBr}_2 + 4\text{Aq}$	352
" Nitrate	$\text{U}_2\text{O}_3(\text{NO}_3)_2 + 6\text{Aq}$	504
Zinc, Bromide	ZnBr_2	225.2
" Chloride	ZnCl_2	136.2
" Iodide	ZnI_2	319.2

TABLE OF THE SOLUBILITIES OF THE PRINCIPAL
SUBSTANCES USED IN PHOTOGRAPHY.

	One part is solu- ble in — parts of water.		100 parts of water dissolve at ordinary temperature.	Solubility in Alcohol.
	Cold.	Boiling		
Acid, Boracic (Anhydrous).	47.01	...	2.13	solub'e
" " (Cryst.).....	25.66	3.0	3.9	sol. in 6 parts @ 60°
" Citric	0.75	0.5	133.0	sol. in 1.15 pt. s.g. 8.20
" Gallic	100.0	3.0	1.0	soluble in 4 parts
" Oxalic	15.5	1.0	6.47	insoluble
" Pyrogallie	2.25	...	...	sol. in alc. and ether
" Salicylic	87.2	v'ry sol	0.35	easily soluble
" Succinic.....	5.0	2.2	20.0	soluble in 3 parts
" Tannic.....	0.8	.5	...	sol. in alc. and ether
" Tartaric.....	.66	.5	150.0	solub'e
Alum (Potash)	10.5	v'ry sol	9.52	insoluble
" (Ammonia).....	7.32	"	13.66	"
Amidol	4	2	...	
Ammonium, Bichromate ...	sol.	sol.	...	insoluble
" Bromide	1.4	0.78	41.1	sol. in 32.3 parts
" Carbonate	3.3	.833	33.0	insoluble
" Chloride.....	2.7	1.00	37.02	sparingly soluble
" Citrate	deliqu	escent	very sol	less sol. in alcohol
" Fluoride.....	v'ry sol	v'ry sol	...	slightly soluble
" Iodide.....	very	s'luble	...	soluble
" Nitrate	2.0	1.0	50.0	freely soluble
" Nitric	del.	dec.	...	
" Oxalate	4.0	2.0	...	soluble
" Salicylate	very	s'luble	...	
" Succinate	"	"	...	
" Sulphocyanide.....	.4	v'ry sol	easily	sol. in water and alc.
Barium, Bromide .....	.96	.5	104.2	easily soluble
" Chloride { Crystallised	2.18	1.5	46.0	very slightly soluble
" " { Anhydrous.....	2.862	...	34.1	
" Iodide	0.48	0.35	208.3	very soluble
" Nitrate.....	12.2	2.84	8.18	
" Sulphate	insol.	...	...
Bromine	33	dec.	very sol	
Cadmium, Bromide	easily	s'luble	...	soluble in 3.4
" Chloride	0.71	0.67	...	
" Iodide	1.08	0.75	92.6	1 in .98 abs. alc.
Calcium, Bromide (Cryst.)...	0.97	...	102.56	easily soluble
" Chloride	0.25	any qy	400.0	
" Iodide	deliqu	escent	...	
Cobalt, Chloride	very	s'luble	...	sol. in alc. and ether
Copper, Acetate	14	5	14	
" Bromide (Cupric) ...	1	.75	...	" "
" Chloride " .....	.75	.75	very sol	" "
" Nitrate	s'luble	...	...	very soluble
" Sulphate.....	2.5	.5	40.0	insoluble

TABLE OF THE SOLUBILITIES, &c.—CONTINUED.

	One part is soluble in — parts of water.		100 parts of water dissolve at ordinary temperature.	Solubility in Alcohol.
	Cold.	Boiling		
Eikonogen	40.0	very sol.	...	soluble
Gold, Perchloride	1	0.75	vy. sol.	soluble in ether
Iron, Chloride { Anhyd. ...	2.0	...	...	sol. in 1 part alcohol
(Ferrous) { Hydrated..	0.68	...	50.0	easily soluble
„ Chloride (Ferric)	0.75	.5	147.0	very soluble
„ Oxalate „	insoluble	except in	...	excess of oxalic acid
„ Sulphate „	sol'ble	...	...	soluble
„ „ (Ferrous) ...	1.3	.30	77.0	insoluble
Lead, Acetate	3.7	3.45	27.0	soluble in 12.5 parts
„ Nitrate	7.7	...	13.0	...
Lithium, Bromide	0.66	0.5	149.8	soluble
„ Chloride	1.315	1	76.0	...
„ Iodide	0.61	0.75	164.0	...
Magnesium, Bromide	deliquescent	vy. sol.	...	very soluble
„ Chloride	1.857	...	53.8	...
„ Iodide	1	0.75	vy. sol.	soluble 1 in 5
„ Sulphate	1.47	0.66	68.04	slightly soluble
Mercury, Chloride {	16.0	3.0	6.25	soluble in 2.35 parts
(Mercuric) { .....	...	...	...	...
Metol	18	10	...	...
Platinum, Bichloride	1	0.5	...	eas. sol. in al. & ether
Potassium, Bichromate	10.0	7	10.0	...
„ Bromide	1.55	1	64.5	...
„ Carbonate	0.9	0.5	111.0	...
„ Chloride	3.03	2.0	33.0	slightly soluble
„ Chloroplatinite ..	5.9	3	...	...
„ Citrate	0.6	0.3	...	...
„ Cyanide	1	0.5	vy. sol.	insol. in pure alcohol
„ Ferrocyanide ...	3.0	1.0	33.3	insoluble
„ Ferridcyanide... ..	2.54	1.22	39.37	very sparingly sol'ble
„ Hydrate	0.5	0.25	200.0	very soluble
„ Iodide	0.7	0.27	143.0	sol. in 40 pts. abs. alc.
„ Nitrate	3.5	0.4	28.57	insoluble
„ Nitrite	deliquescent	and soluble	...	...
„ Oxalate (neutral) ..	3.0	2	33.3	slightly soluble
„ „ (bin.) ...	40.0	...	2.5	insoluble
„ „ (quad.) ..	20.17	...	4.95	insoluble
„ Permanganate ..	16.0	10	6.25	insoluble
„ Sulphocyanide ..	2	1	...	insoluble
Silver, Acetate	very sol'ble	slightly sol.	...	...
„ Citrate	sol'ble	in warm water	...	...
„ Fluoride	deliquescent	...	...	...
„ Nitrate	1.0	0.5	100.0	sol. in 4 pts. boil. alc.
„ Nitrite	300.0	dissol. easily	0.33	insoluble

	One part is soluble in — parts of water.		100 parts of water dissolve at ordinary temperature.	Solubility in Alcohol.
	Cold.	Boiling		
Silver, Oxalate	spar'ly sol.	soluble	...	insoluble
„ Sulphate	200·0	88·0	0·5	insoluble
Sodium, Acetate (Cryst.) ...	2·86	·66	35·0	insoluble
„ Biborate (Borax)...	12·44	2·0	8·033	insoluble
„ Bromide	1·13	1·0	88·5	insoluble
„ Carbonate (Cryst.)	2·0	1·0	50·0	insoluble
„ „ (Anhyd)	3·85	2·07	25·93	insoluble
„ Chloride	2·77	2·77	36·0	sparingly soluble
„ Citrate	1·0	0·5	100·0	sparingly solub'e
„ Hydrate	1·65	0·5	60·63	easily soluble
„ Hyposulphite ... } (Thiosulphate) }	1·5	0·5	vy. sol.	insoluble
„ Iodide	0·55	0·3	180·0	sparingly soluble
„ Nitrate	1·136	1·0	88·03	sol. in 37 parts alc.
„ Nitrite	deliquescent	vy. sol.	very soluble	
„ Phosphate.....	4·0	2·0	25·0	
„ Succinate	very soluble			
„ Sulphate	2·08	0·41	48·0	soluble
„ Sulphite	4·0	2·0	25·0	slightly soluble
„ Bisulphite	very soluble		...	insoluble
„ Sulphocyanide ...				
„ Tartrate.....	1·75	...	56·37	insoluble
„ Tungstate	4·0	2·0	25·0	
Strontium, Bromide ...	1·01	...	99·0	sparingly soluble
„ Chloride	1·88	...	53·0	feebly soluble
„ Iodide	0·56	0·27	178·5	
Uranium, Bromide ... } (Hydrated) ... }	1	0·5	...	soluble
„ Nitrate	0·5	0·25	200·0	sol. in alc. and ether
„ Oxalate	nearly insol.	30·0	...	insoluble
Zinc, Bromide	deliquescent	vy. sol.	very solub'e	
„ Chloride ...	0·333	...	300·0	very soluble
„ Iodide	vy. deliques.	& sol.	very solub'e	

Percentage of Real Ammonia in Solutions of different Densities at
14° Centigrade.—CARIUS.

Specific Gravity.	Percentage Ammonia.	Specific Gravity.	Percentage Ammonia.	Specific Gravity.	Percentage Ammonia.	Specific Gravity.	Percentage Ammonia.
0·8844	36·0	0·9052	27·0	0·9314	18·0	0·9631	9·0
0·8861	35·0	0·9078	26·0	0·9347	17·0	0·9670	8·0
0·8835	34·0	0·9106	25·0	0·9380	16·0	0·9709	7·0
0·8907	33·0	0·9133	24·0	0·9411	15·0	0·9749	6·0
0·8929	32·0	0·9162	23·0	0·9449	14·0	0·9790	5·0
0·8953	31·0	0·9191	22·0	0·9484	13·0	0·9831	4·0
0·8976	30·0	0·9221	21·0	0·9520	12·0	0·9873	3·0
0·9001	29·0	0·9251	20·0	0·9566	11·0	0·9915	2·0
0·9026	28·0	0·9283	19·0	0·9593	10·0	0·9959	1·0

THERMOMETRIC TABLES.

SHOWING THE ASSIMILATION OF THE THERMOMETERS IN USE THROUGHOUT THE WORLD

Celsius.	Réaumur.	Fahrenheit.	Celsius.	Réaumur.	Fahrenheit.
100	80.0	212.0	49	39.2	120.2
99	79.2	210.0	48	38.4	118.4
98	78.4	208.4	47	37.6	116.6
97	77.6	206.6	46	36.8	114.8
96	76.8	204.8	45	36.0	113.0
95	76.0	203.0	44	35.2	111.2
94	75.2	201.2	43	34.8	109.4
93	74.4	199.4	42	33.6	107.6
92	73.6	197.6	41	32.8	105.8
91	72.8	195.8	40	32.0	104.0
90	72.0	194.0	39	31.2	102.2
89	71.2	192.2	38	30.4	100.4
88	70.4	190.4	37	29.6	98.6
87	69.6	188.6	36	28.8	96.8
86	68.8	186.8	35	28.0	95.0
85	68.0	185.0	34	27.2	93.2
84	67.2	183.2	33	26.4	91.4
83	66.4	181.4	32	25.6	89.6
82	65.6	179.6	31	24.8	87.8
81	64.8	177.8	30	24.0	86.0
80	64.0	176.0	29	23.2	84.2
79	63.2	174.2	28	22.4	82.4
78	62.4	172.4	27	21.6	80.6
77	61.6	170.6	26	20.8	78.8
76	60.8	168.8	25	20.0	77.0
75	60.0	167.0	24	19.2	75.2
74	59.2	165.2	23	18.4	73.4
73	58.4	163.4	22	17.6	71.6
72	57.6	161.6	21	16.8	69.8
71	56.8	159.8	20	16.0	68.0
70	56.0	158.0	19	15.2	66.2
69	55.2	156.2	18	14.4	64.4
68	54.4	154.4	17	13.6	62.6
67	53.6	152.6	16	12.8	60.8
66	52.8	150.8	15	12.0	59.0
65	52.0	149.0	14	11.2	57.2
64	51.2	147.2	13	10.4	55.4
63	50.4	145.4	12	9.6	53.6
62	49.6	143.6	11	8.8	51.8
61	48.8	141.8	10	8.0	50.0
60	48.0	140.0	9	7.2	48.2
59	47.2	138.2	8	6.4	46.4
58	46.4	136.4	7	5.6	44.6
57	45.6	134.6	6	4.8	42.8
56	44.8	132.8	5	4.0	41.0
55	44.0	131.0	4	3.2	39.2
54	43.2	129.2	3	2.4	37.4
53	42.4	127.4	2	1.6	35.6
52	41.6	125.6	1	0.8	33.8
51	40.8	123.8	0	0.0	32.0
50	40.0	122.0			

THERMOMETRIC RULES.

The following rules for the rapid conversion of degrees in one system into another will be found useful:—

To CONVERT CENTIGRADE INTO REAUMUR:

Degrees Réaumur $\times 4 \div 5$.

Ex.— $80^{\circ} \text{R} \times 4 \div 5 = 64^{\circ} \text{C}$.

To CONVERT CENTIGRADE INTO FAHRENHEIT:

Degrees Centigrade $(\times 9 \div 5) + 32$.

Ex.— $80^{\circ} \text{C} \times 9 \div 5 = 144 + 32 = 176^{\circ} \text{F}$.

To CONVERT REAUMUR INTO CENTIGRADE:

Degrees Réaumur $\times 5 \div 4$.

Ex.— $60^{\circ} \text{R} \times 5 \div 4 = 75^{\circ} \text{C}$.

To CONVERT FAHRENHEIT INTO CENTIGRADE:

(Degrees Fahr.—32) $\times 5 \div 9$.

Ex.— $100^{\circ} \text{F} - 32 = 78 \times 5 \div 9 = 43.3^{\circ} \text{C}$.

To CONVERT REAUMUR INTO FAHRENHEIT:

Degrees Réaumur $(\times 9 \div 4) + 32$.

Ex.— $16^{\circ} \text{R} \times 9 \div 4 = 36 + 32 = 68^{\circ} \text{F}$.

To CONVERT FAHRENHEIT INTO REAUMUR:

(Degrees Fahrenheit—32) $\div 9 \times 4$.

Ex.— $95^{\circ} \text{F} - 32 = 63 \div 9 \times 4 = 28^{\circ} \text{R}$.

TABLE OF THE WAVE-LENGTHS OF THE PRINCIPAL FRAUNHOFER SPECTRUM LINES AND THE ELEMENTS THAT GIVE THEM.

Colour.	Wave-Lengths in $\mu\mu$.	Ele- ment.	Colour.	Wave-Lengths in $\mu\mu$.	Ele- ment.
Infra red	Y { 899.04	O (?)	Ultra-violet	K 393.386	Ca
	898.65			L 382.056	Fe
	X ^{iv} 880.61			M { 372.778	Fe
	X ⁱⁱⁱ 866.14			M { 372.713	Fe
	X ⁱⁱ 854.18			N 358.132	Fe
	X ⁱ 849.70			O { 344.107	Fe
	Z 822.64			O { 344.069	Fe
Red	A 759.397			P 336.130	Ca
Orange	B 686.738			Q 328.687	Fe
	C 656.296			R 318.030	Fe
Yellow	D ¹ 589.608			S { 310.077	Fe
	D ² 589.013			S { 310.038	Fe
Green	E { 527.043			S { 310.004	Fe
	526.965			302.115	Fe
	b ¹ 518.373			T { 302.070	Fe
Cyanine blue	F 486.143			U { 294.800	Fe
Indigo	G 430.796			U { 294.777	Fe
Violet	h 410.184				
	H 396.861				

RELATIVE EXPOSURES FOR VARYING PROPORTIONS OF IMAGE TO THE ORIGINAL.

[The following paper was read before the Royal Photographic Society by Mr. W. E. Debenham. Its usefulness would be diminished by abbreviation, hence we reproduce it in full.—Ed.]

WHEN an enlarged photograph has to be made, either from a negative or print, it is commonly understood that the greater the degree of enlargement the longer will be the exposure required, but I have generally found only the vaguest ideas to exist as to the amount by which such exposure has to be prolonged. Sometimes, indeed, it is assumed that the exposure will be in direct inverse proportion to the area covered, so that a copy of twice the linear dimensions of the original—covering, as it does, the area of four times the size—would require an exposure of four times that sufficing for a copy of the same size. This calculation, however, omits to recognise an important factor, and leads to serious error, the actual exposure required in the case mentioned (assuming the same lens and stop to be used) being not four times, but two and a quarter times, that of a copy of same size; whilst, when we come to high degrees of enlargement, the error would amount to an indication of nearly four times the exposure actually required.

To find the relative exposure, add one to the number of times that the length of the original is contained in the length of the image, and square the sum. This will give the figure found in the third column of the annexed table.

As examples: suppose a copy is wanted having twice the linear dimensions of the original. Take the number 2, add 1 to it, and square the sum, $3^2=9$. Again, if a copy is to be of eight times the linear dimensions of the original, take the number 8, add 1, and square the sum, $9^2=81$. Copies respectively twice and eight times the size (linear) of the original will thus require relative exposures of 9 and 81—i.e., the latter will require nine times the exposure of the former.

It is convenient to have a practical standard for unity. An image of the same size as the original is a familiar case, and serves as such standard. By dividing the figures in the third column by four, we get at the figures in the last column, which represent the exposure required for varying degrees of enlargement or reduction, compared with the exposure for a copy of the same size.

The table is carried up to enlargements of thirty diameters; that is about the amount required for enlarging a *carte-de-visite* to life size.

The exposures required in reductions do not vary at all to the same extent that they do in enlargements. It has, therefore, not been thought necessary to fill in the steps between images of $\frac{1}{10}$ and $\frac{1}{20}$, and between $\frac{1}{20}$ and $\frac{1}{30}$ of the size of the original. Beyond $\frac{1}{30}$ there is scarcely any perceptible difference in the exposure until disturbance comes in from another cause, a considerable distance of illuminated atmosphere (haze or fog) intervening.

The figures in the second column will also serve as a table for distances from the lens to the plate and to the original, all that is necessary being to multiply by the principal focus of the lens in use. In the case of enlargements the figures less than 2 must be multiplied to get the

distance from the original to the lens, and the figures greater than 2 or the distance from lens to image. For reductions, the figures less than 2, multiplied by the principal focus of the lens, yield the distance from lens to plate; and the figures higher than 2, similarly multiplied, give the distance of original from lens.

Proportion of image to origi- nal (linear).	Distance of image from lens* in terms of principal focus.	Proportionate exposures.	Exposures pro- portioned to that required for copying same size.
$\frac{1}{80}$	$1\frac{1}{80}$	1.07	.27
$\frac{1}{50}$	$1\frac{1}{50}$	1.10	.28
$\frac{1}{40}$	$1\frac{1}{40}$	1.21	.3
$\frac{1}{30}$	$1\frac{1}{30}$	1.27	.31
$\frac{1}{25}$	$1\frac{1}{25}$	1.36	.34
$\frac{1}{20}$	$1\frac{1}{20}$	1.56	.39
$\frac{1}{15}$	$1\frac{1}{15}$	2.25	.56
$\frac{1}{10}$	$1\frac{1}{10}$	3.06	.76
(Same size) 1	2	4	1
2	3	9	2.25
3	4	16	4
4	5	25	6.25
5	6	36	9
6	7	49	12.25
7	8	64	16
8	9	81	20.25
9	10	100	25
10	11	121	30.25
11	12	144	36
12	13	169	42.25
13	14	196	49
14	15	225	56.25
15	16	256	64
16	17	289	72.25
17	18	324	81
18	19	361	90.25
19	20	400	100
20	21	441	110.25
21	22	484	121
22	23	529	132.25
23	24	576	144
24	25	625	156.25
25	26	676	169
26	27	729	182.25
27	28	784	196
28	29	841	210.25
29	30	900	225
30	31	961	240.25

* With a double lens it is usually sufficient to measure from the position of the diaphragm plate.

"UNIFORM SYSTEM" NUMBERS FOR STOPS FROM τ TO $\frac{1}{100}$.

In the following table Mr. S. A. Warburton has calculated the exposure necessary with every stop from $\frac{1}{1}$ to $\frac{1}{100}$ compared with the unit stop of the "uniform system" of the Royal Photographic Society of Great Britain. The figures which are underlined show in the first column what $\frac{f}{a}$ must be in order to increase the exposure in geometrical ratio from $\frac{f}{4}$, the intermediate numbers showing the uniform system number for any other aperture.

1	U. S. No.	f	U. S. No.	f	U. S. No.
<u>1</u>	<u>097</u>	15	14.06	58	210.25
<u>1.414</u>	<u>1</u>	16	16	59	217.56
<u>1.5</u>	<u>1.140</u>	17	18.06	60	225.00
<u>1.58</u>	<u>1.191</u>	18	20.25	61	232.56
<u>2</u>	<u>1.2</u>	19	22.56	62	240.25
<u>2.14</u>	<u>1.316</u>	20	25.00	63	248.06
<u>2.24</u>	<u>1.390</u>	21	27.56	64	256
<u>2.828</u>	<u>1.5</u>	22	30.25	65	264.06
<u>2.84</u>	<u>1.472</u>	22.62	32	66	272.25
<u>3</u>	<u>1.562</u>	23	33.06	67	280.56
<u>3.14</u>	<u>1.660</u>	24	36.00	68	289.00
<u>3.15</u>	<u>1.765</u>	25	39.06	69	297.56
<u>3.24</u>	<u>1.878</u>	26	42.25	70	306.25
<u>4</u>	<u>1.00</u>	27	45.56	71	315.06
<u>4.14</u>	<u>1.12</u>	28	49.00	72	324.00
<u>4.15</u>	<u>1.26</u>	29	52.56	73	333.06
<u>4.24</u>	<u>1.41</u>	30	56.25	74	342.25
<u>5</u>	<u>1.56</u>	31	60.06	75	351.56
<u>5.14</u>	<u>1.72</u>	32	64	76	361.00
<u>5.15</u>	<u>1.89</u>	33	68.06	77	370.56
<u>5.656</u>	<u>2</u>	34	72.25	78	380.25
<u>5.66</u>	<u>2.06</u>	35	76.56	79	390.06
<u>6</u>	<u>2.25</u>	36	81.00	80	400.00
<u>6.14</u>	<u>2.44</u>	37	85.56	81	410.06
<u>6.15</u>	<u>2.64</u>	38	90.25	82	420.25
<u>6.24</u>	<u>2.84</u>	39	95.06	83	430.56
<u>7</u>	<u>3.06</u>	40	100.00	84	440.00
<u>7.14</u>	<u>3.28</u>	41	105.06	85	451.56
<u>7.15</u>	<u>3.51</u>	42	110.25	86	462.25
<u>7.24</u>	<u>3.75</u>	43	115.56	87	473.06
<u>8</u>	<u>4</u>	44	121.00	88	484.00
<u>8.14</u>	<u>4.25</u>	45	126.56	89	495.06
<u>8.15</u>	<u>4.51</u>	45.25	128	90	506.25
<u>8.24</u>	<u>4.78</u>	46	132.25	90.50	512
<u>9</u>	<u>5.06</u>	47	138.06	91	517.56
<u>9.14</u>	<u>5.34</u>	48	144.00	92	529.00
<u>9.15</u>	<u>5.64</u>	49	150.06	93	540.56
<u>9.24</u>	<u>5.94</u>	50	156.25	94	552.25
<u>10</u>	<u>6.25</u>	51	162.56	95	564.06
<u>11</u>	<u>7.56</u>	52	169.00	96	576.00
<u>11.31</u>	<u>8</u>	53	175.56	97	588.06
<u>12</u>	<u>9.00</u>	54	182.25	98	600.25
<u>13</u>	<u>10.56</u>	55	189.06	99	612.56
<u>14</u>	<u>12.25</u>	56	196.00	100	625.00
		57	203.06		

TABLE SHOWING THE HOURLY VARIATION IN THE SUN'S POSITION

CALCULATED B

Mean Time	A.M.						
	5	6	7	8	9	10	11
Jan. 1					41 E.	29 E.	16°
Feb. 1				59 E.	47	35	19
„ 20				63	50	36	20
Mar. 8			77° E.	65	52	37	21
„ 21			80	67	53	38	22
April 2		94° E.	82	69	55	40	21
„ 19	108° E.	97	85	72	58	41	21
May 8 4 A.M.	111	100	89	76	61	44	22
„ 27 125° E.	114	103	91	79	65	47	26
June 22 127° E.	116	106	95	82	68	51	28
July 18	115	104	93	81	67	51	29
Aug. 5	114	101	91	78	62	47	27
„ 25		97	85	73	59	43	
Sept 10		92	80	67	54	38	19
„ 23		88	77	64	50	35	17
Oct. 6			73	60	46	31	15
„ 22			69	57	44	29	12
Nov. 9				53	40	27	11
„ 22				52	39	25	11
Dec. 22					40	27	15

Calculated for latitude 52° N.

IN DEGREES FROM THE SOUTH, AT DIFFERENT SEASONS OF THE YEAR.

J. A. C. BRANFILL.

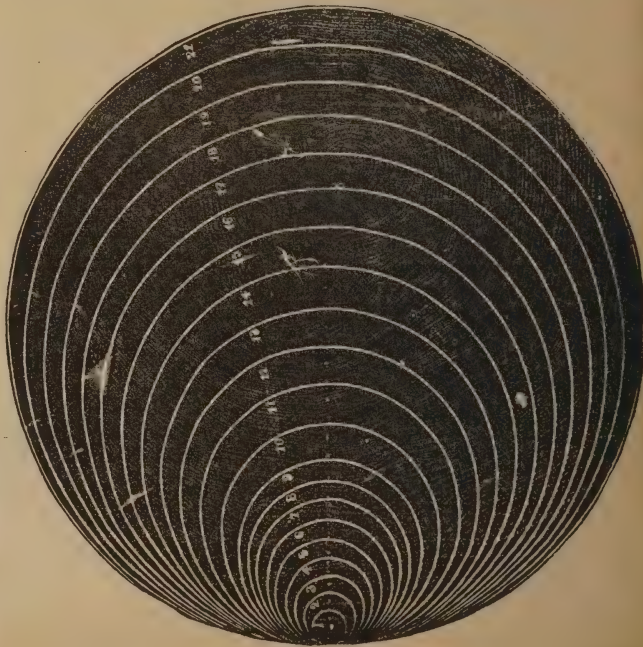
Noon	P.M.							
	1	2	3	4	5	6	7	8
1° E.	13° W.	27° W.	40° W.					
4	12	27	40	53° W.				
4	13	29	44	57				
4	15	31	46	61	73° W.			
3	17	34	49	64	77	89° W.		
1	20	39	54	69	81	92		
1° W.	22	42	58	73	85	97	108° W.	
2	26	46	63	77	90	102	113	
1° W.	27	49	67	80	93	104	114	126° W.*
1° E	27	49	67	81	94	105	115	127° W.
2	23	46	64	79	91	102	113	125
2	22	44	61	75	88	100	111	
1	21	41	58	72	85	97	108*	
1° W.	21	39	55	69	82	94		
3	21	38	53	67	79			
4	21	37	52	65	77			
	20	36	50	63				
5	19	34	47	59				
4	19	33	45					
1° W.	15	28	41					

N.B.—Bearings marked * are taken when the sun is below the horizon.

THE ROYAL PHOTOGRAPHIC SOCIETY'S STANDARD DIAPHRAGMS.

THE annexed diagram and table are intended to facilitate the calculation of the proper number with which to mark the diaphragms according to the Royal Photographic Society of Great Britain's Uniform System, which will be found described on another page. This number is called the "U. S." (or uniform system number). The numbered circles in the diagram represent the sizes of stops. The photographer, knowing the equivalent focus of his lens, looks along the line opposite the number which represents the circle nearest inside to his diaphragm, and when he gets to the column headed by that equivalent focus the number there found is the U. S. number to be marked on the diaphragm. For example: a lens of eight inches equivalent focus has a diaphragm in size about No. 5 on the diaphragm; running the eye along the line opposite No. 5, we find in the column under—"focus eight inches" the number 11, which is the U. S. number required.

No. of Circle.	4 focus	5 focus	6 focus	7 focus	8 focus	9 focus	10 focus	12 focus	14 focus
1	25	39	56						
2	11	17	25	34	44	56	68		
3	$6\frac{1}{2}$	10	14	19	25	31	40	56	
4	4	$6\frac{1}{4}$	9	12	16	20	25	36	48
5	$2\frac{3}{4}$	$4\frac{1}{4}$	$6\frac{1}{2}$	$8\frac{1}{2}$	11	14	17	25	34
6	2	$3\frac{1}{2}$	$4\frac{1}{2}$	$6\frac{1}{4}$	8	10	13	18	25
7	$1\frac{1}{2}$	$2\frac{3}{4}$	$3\frac{1}{2}$	$4\frac{3}{4}$	6	8	10	14	19
8	$1\frac{1}{4}$	2	$2\frac{3}{4}$	$3\frac{3}{4}$	5	$6\frac{1}{2}$	8	11	15
9	1	$1\frac{1}{2}$	$2\frac{1}{4}$	3	4	5	$6\frac{1}{4}$	9	$12\frac{1}{4}$
10		1	$1\frac{1}{8}$	$2\frac{1}{8}$	$2\frac{3}{8}$	$3\frac{1}{8}$	$4\frac{1}{8}$	6	$8\frac{1}{8}$
11			$1\frac{1}{4}$	$1\frac{1}{2}$	2	$2\frac{1}{2}$	$3\frac{1}{2}$	5	6
12			$\frac{7}{8}$	$1\frac{1}{8}$	$1\frac{1}{4}$	2	$2\frac{1}{4}$	$3\frac{1}{4}$	$4\frac{3}{4}$
13				1	$1\frac{1}{4}$	$1\frac{5}{8}$	$1\frac{3}{4}$	$2\frac{3}{4}$	4
14					1	$1\frac{1}{4}$	$1\frac{1}{2}$	2	3
15						1	$1\frac{1}{8}$	$1\frac{1}{4}$	$2\frac{1}{2}$
16							1	$1\frac{1}{2}$	2
17								$1\frac{1}{8}$	$1\frac{3}{8}$
18								$1\frac{1}{16}$	$1\frac{1}{8}$
19								1	$1\frac{1}{16}$
20									$1\frac{1}{16}$
2									1



CONTINENTAL STOPS AND THEIR U.S. EQUIVALENTS.

MR. EDWARD M. NELSON says: "Photographers are frequently troubled by the Continental nomenclature of the stops, and wish to know the U.S. equivalents for them. The method of finding this out is very simple. All that is necessary is to divide $f\cdot4$ by the ratio to be converted, and square the result. Example: required the U.S. equivalent of $f\cdot9$:—

$$\frac{f}{4} \div \frac{f}{9} = \frac{f}{4} \times \frac{9}{f} = 2\cdot25;$$

the square of $2\cdot25$ is $5\cdot06$, the U.S. number required. The following is a table of the Continental stops more commonly met with, and also the Continental values of the U.S. ratios :—

Ratios. f divided by	Continental Values.	U.S. Values.	Ratios. f divided by	U.S. Values.	Continental Values.
4·5	512	1·26	2·828	·5	1250
6·3	256	2·48	4	1	625
7	204	3·06	5·66	2	312
7·2	193	3·24	8	4	156
7·7	168	3·71	11·31	8	78
9	128	5·06	16	16	39
12·5	64	9·77	22·6	32	20
14·5	47	13	32	64	9·77
18	32	20	45·3	128	4·88
25	16	39	64	256	2·44
36	8	81	90·5	512	1·22
50	4	156	...	...	...
71	2	315	...	...	...
100	1	625	...	...	...

"To find the f ratio for the U.S. values, multiply the U.S. value by 16 and the square root of the product is the required ratio. Example: What is the ratio of U.S. 32? 32 multiplied by 16 is 512, the square root of this is 22·6, the ratio required.

"To find the f ratio for the Continental stops, multiply the reciprocal of the square root of the Continental value by 100. Example: What is the f ratio of the Continental value 16? The square root of 16 is 4, the reciprocal of 4 is ·25, which, multiplied by 100, is 25, the ratio required.

"Note.—The Continental ratios of 512, 256, and 8, ought to be 4·4, 6·25, and 35, respectively. The figures in the list are those extracted from Continental opticians' catalogues."

TABLE SHOWING DISPLACEMENT ON GROUND GLASS OF OBJECTS IN MOTION.

BY HENRY L. TOLMAN.

From the "Photographic Times."

LENS 6 INCHES EQUIVALENT FOCUS, GROUND GLASS AT PRINCIPAL FOCUS OF LENS.

Miles per hour.	Feet per second.	Distance on Ground Glass, in Inches, with Object 30 Feet away.	Same with Object 60 Feet away.	Same with Object 120 Feet away.
1	1½	·29	·15	·073
2	3	·59	·29	·147
3	4½	·88	·44	·220
4	6	1·17	·59	·293
5	7½	1·47	·73	·367
6	9	1·76	·88	·440
7	10½	2·05	1·03	·513
8	12	2·35	1·17	·587
9	13	2·64	1·32	·660
10	14½	2·93	1·47	·733
11	16	3·23	1·61	·807
12	17½	3·52	1·76	·880
13	19	3·81	1·91	·953
14	20½	4·11	2·05	1·027
15	22	4·40	2·20	1·100
20	29	5·87	2·93	1·467
25	37	7·33	3·67	1·833
30	44	8·80	4·40	2·200
35	51	10·27	5·13	2·567
40	59	11·73	5·97	2·933
45	66	13·20	6·60	3·300
50	73	14·67	7·33	3·667
55	80	16·13	8·06	4·033
60	88	17·60	8·80	4·400
75	110	22·00	11·00	5·500
100	147	29·33	14·67	7·333
125	183	36·67	18·33	9·167
150	220	44·00	22·00	11·000

STANDARDS OF THE ROYAL PHOTOGRAPHIC SOCIETY.

THE series of standards adopted by the Society in 1881, and modified in 1891, have been again carefully re-considered by a committee of experts appointed by the Council. Their recommendations, which are embodied below, have been adopted by the Council, by whose orders this schedule is now published.

LENS DIAPHRAGMS.

(1) That intensity ratio be defined as dependent upon the *effective aperture*, and not upon the diameter of the diaphragm, in relation to the focal length of the lens.

(2) That effective aperture be determined in the following manner: The lens shall be focussed for parallel rays; an opaque screen shall be placed in the principal focal plane, the plate being provided in its centre (in the axis of the lens) with a pin-hole; an illuminant shall be placed immediately behind the pin-hole, and the diameter of the beam of light emerging from the front surface of the lens shall be the measure of the effective aperture.

NOTE.—It will be found, except when the diaphragm is situated in front of the lens, that the diameter of the diaphragm itself is seldom identical with the effective aperture.

(3) That every diaphragm be marked with its true intensity ratio, as above defined, in the following order of sequence; $f-1$, $f-1.4..$, $f-2$, $f-2.8..$, $f-4$, $f-5.6..$, $f-8$, $f-11.3..$, $f-16$, $f-22.6..$, $f-32$, $f-45.2..$, $f-64$, &c., each diaphragm requiring double the exposure required by the preceding diaphragm.

Should the greatest effective aperture of a lens not conform exactly to one of the intensities set forth above, this aperture should be marked in accordance with the definition of effective aperture, but all succeeding smaller apertures should be marked in uniformity with the intensities recommended in the above sequence.

LENS MOUNTS AND FITTINGS.

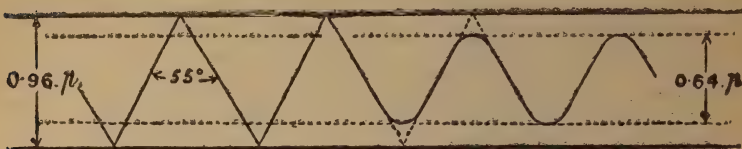
(1) That the equivalent focal length of a lens be engraved upon its mount.

(2) That the following series of screws for photographic lens flange fittings be adopted, it being understood that, in order to secure free interchangeability, every male screw should be made at least as small as these sizes, and every female screw at least as large:—

Diameter in Inches.	No. of Threads per Inch.	Core Diameter in Inches.
1*	24	.9466
1.25	24	1.1966
1.5	24	1.4466
1.75	24	1.6966
2	24	1.9466
2.25	24	2.1966
2.5	24	2.4466
3	24	2.9466
3.5	12	3.3933
4	12	3.8933
5	12	4.8933
And upwards, advancing by inches.	12	

* For screws less than one inch in diameter, the Royal Microscopical Society's Standard screw should be adopted.

The form of thread is that known as Whitworth's Angular Thread, and is designed as follows:—



Two parallel lines, at a distance apart equal to 0.96 of the screw pitch, are intersected by lines inclined to each other at fifty-five degrees, is shown in the figure at A. One-sixth of the vertical height of the triangular spaces so obtained is rounded off both at the top and bottom, leaving the form of the screw thread as at B. The depth of this thread is 0.64 of the screw pitch. It should be understood that this is the theoretical form of the Whitworth thread, but that for the purpose of securing real interchangeability it is generally found necessary to use chasers or other threading tools which have additional prominence upon their points which come first into operation and are subject to most wear. For this purpose an addition may be made to the amount of one-tenth ($\frac{1}{10}$) of the theoretical depth of thread, or to any less amount that may be sufficient.

(3) That every flange and adapter have a mark upon its front to indicate the position of the diaphragm slot or index of any lens when screwed home. The mark on any adapter should coincide with the mark upon any flange into which it is screwed. This mark should be placed at the point at which the thread becomes complete at the shoulder of the flange or adapter.

CAMERA SCREWS.

That all screws fitted to cameras, either for attachment to the stand, for fixing rising fronts, or for other movable parts, be either $\frac{3}{16}$, $\frac{1}{4}$, $\frac{5}{16}$, or $\frac{3}{8}$ of an inch in external diameter, and in pitch of thread and other details in accordance with the generally recognised Whitworth standards for these sizes.

TABLE FOR ENLARGEMENTS.

Focus of Lens, inches.	TIMES OF ENLARGEMENT AND REDUCTION.							
	1 inches.	2 inches.	3 inches.	4 inches.	5 inches.	6 inches.	7 inches.	8 inches.
2	4 4	6 3	8 $2\frac{2}{3}$	10 $2\frac{1}{2}$	12 $2\frac{1}{3}$	14 $2\frac{1}{3}$	16 $2\frac{1}{7}$	18 $2\frac{1}{4}$
$2\frac{1}{2}$	5 5	$7\frac{1}{2}$ $3\frac{3}{4}$	10 $3\frac{1}{3}$	$12\frac{1}{2}$ $3\frac{1}{2}$	15 3	$17\frac{1}{2}$ $2\frac{1}{2}$	20 $2\frac{2}{7}$	$22\frac{1}{2}$ $2\frac{1}{6}$
3	6 6	9 $4\frac{1}{2}$	12 4	15 $3\frac{3}{5}$	18 $3\frac{2}{5}$	21 $3\frac{1}{2}$	24 $3\frac{3}{7}$	27 $3\frac{3}{8}$
$3\frac{1}{2}$	7 7	$10\frac{1}{2}$ $5\frac{1}{4}$	14 $4\frac{2}{3}$	$17\frac{1}{2}$ $4\frac{3}{8}$	21 $4\frac{1}{5}$	$24\frac{1}{2}$ $4\frac{1}{5}$	28 4	$31\frac{1}{2}$ $3\frac{1}{6}$
4	8 8	12 6	16 $5\frac{1}{3}$	20 5	24 $4\frac{2}{5}$	28 $4\frac{2}{3}$	32 $4\frac{2}{7}$	36 $4\frac{1}{2}$
$4\frac{1}{2}$	9 9	$13\frac{1}{2}$ $6\frac{3}{4}$	18 6	$22\frac{1}{2}$ $5\frac{2}{5}$	27 $5\frac{2}{5}$	$31\frac{1}{2}$ $5\frac{1}{4}$	36 $5\frac{1}{7}$	$40\frac{1}{2}$ $5\frac{1}{6}$
5	10 10	15 $7\frac{1}{2}$	20 $6\frac{2}{3}$	25 $6\frac{1}{4}$	30 6	35 $5\frac{5}{8}$	40 $5\frac{5}{7}$	45 $5\frac{5}{8}$
$5\frac{1}{2}$	11 11	$16\frac{1}{2}$ $8\frac{1}{4}$	22 $7\frac{1}{5}$	$27\frac{1}{2}$ $6\frac{1}{8}$	33 $6\frac{3}{8}$	$38\frac{1}{2}$ $6\frac{5}{12}$	44 $6\frac{2}{7}$	$49\frac{1}{2}$ $6\frac{3}{16}$
6	12 12	18 9	24 8	30 $7\frac{1}{2}$	36 $7\frac{1}{5}$	42 7	48 $6\frac{2}{7}$	54 $6\frac{3}{8}$
7	14 14	21 $10\frac{1}{2}$	28 $9\frac{1}{3}$	35 $8\frac{3}{4}$	42 $8\frac{2}{5}$	49 $8\frac{1}{8}$	56 8	63 $7\frac{1}{8}$
8	16 16	24 12	32 $10\frac{2}{3}$	40 10	48 $9\frac{2}{5}$	56 $9\frac{1}{8}$	64 $9\frac{1}{7}$	72 9
9	18 18	27 $13\frac{1}{2}$	36 12	45 $11\frac{1}{4}$	54 $10\frac{3}{5}$	63 $10\frac{1}{2}$	72 $10\frac{2}{7}$	81 $10\frac{1}{8}$

THE object of this table is to enable any manipulator who is about to enlarge (or reduce) a copy any given number of times, to do so without troublesome calculation. It is assumed that the photographer knows exactly what the focus of his lens is, and that he is able to measure accurately from its optical centre. The use of the table will be seen from the following illustration:—A photographer has a *carte* to enlarge to four times its size, and the lens he intends employing is one of six inches equivalent focus. He must, therefore, look for 4 on the upper horizontal line, and for 6 in the first vertical column, and carry his eye to where these two join, which will be at $30-7\frac{1}{2}$. The greater of these is the distance the sensitive plate must be from the centre of the lens; and the lesser, the distance of the picture to be copied. To *reduce* a picture any given number of times the same method must be followed, but in this case the greater number will represent the distance between the lens and the picture to be copied; the latter, that between the lens and the sensitive plate. This explanation will be sufficient for every case of enlargement or reduction.

If the focus of the lens be twelve inches, as this number is not in the column of focal lengths, look out for six in this column and multiply by 12, and so on with any other numbers.

TABLE OF VIEW-ANGLES.

By CLARENCE E. WOODMAN, Ph.D.

DIVIDE THE BASE OF THE PLATE BY THE EQUIVALENT FOCUS OF THE LENS.

If the quotient is	The angle is	If the quotient is	The angle is	If the quotient is	The angle is
	Degrees.		Degrees.		Degrees.
·282	16	·748	41	1·3	66
·3	17	·763	42	1·32	67
·317	18	·788	43	1·36	68
·335	19	·808	44	1·375	69
·353	20	·828	45	1·4	70
·37	21	·849	46	1·427	71
·389	22	·87	47	1·45	72
·407	23	·89	48	1·48	73
·425	24	·911	49	1·5	74
·443	25	·933	50	1·53	75
·462	26	·954	51	1·56	76
·48	27	·975	52	1·59	77
·5	28	1·	53	1·62	78
·517	29	1·02	54	1·649	79
·533	30	1·041	55	1·678	80
·555	31	1·063	56	1·7	81
·573	32	1·086	57	1·739	82
·592	33	1·108	58	1·769	83
·611	34	1·132	59	1·8	84
·631	35	1·155	60	1·833	85
·65	36	1·178	61	1·865	86
·67	37	1·2	62	1·898	87
·689	38	1·225	63	1·931	88
·708	39	1·25	64	1·965	89
·728	40	1·274	65	2·	90

Example.—Given a lens of 13 inches equivalent focus; required the angle included by it on plates respectively $3\frac{1}{4} \times 4\frac{1}{4}$, $4\frac{1}{4} \times 6\frac{1}{2}$, $6\frac{1}{4} \times 8\frac{1}{4}$, 8×10 , 10×12 , and 11×14 .

1. Dividing 4·25 by 13, we have as quotient ·327—midway between the decimals ·317 and ·335 of our table; therefore the required angle is 18° 30'. Similarly—

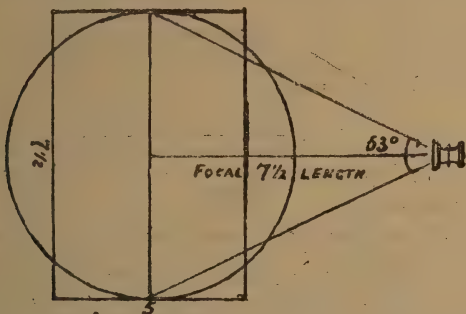
				Degrees.
2.	6·5	÷	13	= 5; corresponding to 28.
3.	8·5	÷	13	= 654; " " 36.
4.	10	÷	13	= 77; " " 42½.
5.	12	÷	13	= 923; " " 49½.
6.	14	÷	13	= 1·08; " " 57.

VIEW-ANGLES.

THE late Mr. M. J. Michael wrote us as follows:—

'I take this opportunity of drawing your attention to the "Table of View-angles," in THE BRITISH JOURNAL PHOTOGRAPHIC ALMANAC. If used as there directed, it leads to results inaccurate and misleading; inaccurate, since the angle included on a plate should be measured along the diagonal and not along the base of the plate; and the information is misleading, since it leads to the supposition that a lens having the angle which is given by using the table, as there directed, will cover the plate mentioned. Hence all the examples given at the foot of the table specify lenses that, if used on the given plates, must leave at least two, and if the lens is placed centrally, all the four, corners uncovered. If the corners of a plate are to be covered, the angle embraced by the lens must be sufficient to cover the diagonal of the plate; in other words, the circle of illumination given by the lens must have a diameter equal to the diagonal of the plate, and not only equal to the length of the base of the plate.

'A simple figure makes this evident. If the focal length of the lens, e.g., seven and a half inches on a $7\frac{1}{2} \times 5$ plate, is equal to the base of the plate, then, using the table as is directed, the quotient obtained is 1 and the angle 53° . From the figure, which is to scale, it is evident that,



arrange the plate as you will, at least two, and if placed centrally, all four corners must be uncovered, i.e., outside the circle of illumination.

'The table itself is correct when used as is usually directed by dividing the diagonal of any given plate by the focal length of the lens (see Dr. Eder, *Recepte und Tabellen*, fourth edition, page 94). If, therefore, the directions for using it were altered by substituting "diagonal of the plate" for the words "base of the plate," the results obtained would be correct. It would save trouble if beneath the table were printed the length of the diagonals of the plates most commonly used:—

$3\frac{1}{4} \times 3\frac{1}{4}$ diagonal	4.6 inches.	$6\frac{1}{2} \times 8\frac{1}{2}$ diagonal	10.7 inches.
$3\frac{1}{4} \times 4\frac{1}{4}$ "	5.3 "	8×10 "	12.4 "
4×5 "	6.4 "	10×12 "	15.6 "
$4\frac{1}{2} \times 6\frac{1}{2}$ "	8. "	12×15 "	19.4 "
$5 \times 7\frac{1}{2}$ "	9. "		

EQUATIONS RELATING TO FOCI, &c.

THE following simple optical formulæ and calculations, worked out by Mr. J. A. C. Branfill, will prove useful in many branches of photography, especially where several lenses of varying foci are in constant use for a variety of purposes:—

Let p = Principal focus.

F = Greater conjugate do.

f = Lesser do. do.

D = $F + f$ = distance of image from object.

r = Ratio of any dimension in original to the same dimension in copy (in case of reduction), or *vice versâ* (in case of enlargement).

a = Effective diameter of diaphragm.

U. S. No. = 'Uniform System' No. of do.

x = Comparative exposure required.

$$\text{Then } p = D \times \frac{r}{(r+1)^2} = \frac{Ff}{D} = \frac{F}{r+1} = \frac{rf}{r+1}$$

$$F = p(r+1) = \frac{pf}{f-p} = rf = \frac{rD}{r+1}$$

$$f = p \times \frac{(r+1)}{r} = \frac{p}{F-p} = \frac{D}{r+1} = \frac{F}{r}$$

$$D = p \times \frac{(r+1)^2}{r} = f(r+1) = p \left(2 + r + \frac{1}{r} \right)$$

$$r = \frac{F-p}{p} = \frac{p}{f-p} = \frac{F}{f}$$

$$\text{U. S. No.} = \frac{p^2}{16a^2}$$

$$x = \frac{f^2}{16a^2} = \frac{p^2}{16a^2} \times \frac{(r+1)^2}{r^2}$$

N.B.—For ordinary landscape work, where r is greater than 20, x may be taken as $\frac{p^2}{16a^2}$

NOTE.—In case the above may not be clear to some photographers, the following rules may be better understood:—

To find the principal focus of a lens (p), focus a near object in the camera, and measure the distance between it and the ground-glass (D); next find the proportion which any dimension in the object bears to the same dimension on the ground-glass (r). Thus, if the original dimension be four times as large as its reproduction, we say that r equals (=) 4. Multiply D by r , and divide the product by the square of a number greater by one than r , or $(r+1)$. This rule was lately published by Mr. Debenham.

To find the lesser conjugate focus (f) (if p and r are known) multiply p by the sum of $r+1$, and divide the product by r . Or divide D by $r+1$.

To find the greater conjugate focus (F) multiply p by $r+1$. Or multiply f by r .

To find D (the distance which the ground-glass should be from the object to be copied in order to get a given value for r) multiply p by the sum of $r + \frac{1}{r} + 2$.

To find r divide $F-p$ (the difference between F and p) by p . Or divide p by $f-p$. Or divide F by f .

To find x divide the square of f by 16 times the square of a (the diameter of aperture to lens).

For example: focus an object which is five inches high, so that it is one inch high on the ground glass; thus we know that $r = 5$. Next measure the distance between the object and the ground glass (D), which is found to be 45 inches.

Then $p = 45 \times (\text{multiplied by}) 5 \div (\text{divided by}) 6 \times 6 = 6\frac{1}{4}$ inches.

$f = 6\frac{1}{4} \times 6 \div 5 = 7\frac{1}{2}$ inches. Or $f = 45 \div 6 = 7\frac{1}{2}$ inches.

$F = 6\frac{1}{4} \times 6 = 37\frac{1}{2}$ inches. Or $F = 7\frac{1}{2} \times 5 = 37\frac{1}{2}$ inches.

$D = 6\frac{1}{4} \times (5 + \frac{1}{5} + 2) = 6\frac{1}{4} \times 7\frac{1}{5} = 45$ inches.

$r = (37\frac{1}{2} - 6\frac{1}{4}) \div 6\frac{1}{4} = 5$. Or $r = 6\frac{1}{4} \div (7\frac{1}{2} - 6\frac{1}{4}) = 5$.

MR. E. M. NELSON'S TABLE OF DISTANCES FOR LANTERN PROJECTION.
DISTANCE OF PROJECTION LENS FROM SCREEN, MASK BEING THREE INCHES.

Foci	4½	5	5½	6	7	8	9	10	11	12	14	15	16	18
Disc.	ft. in.	ft. in.	ft. in.	ft. in.	ft. in.	ft. in.	ft. in.	ft. in.	ft. in.		ft. in.	ft. in.	ft. in.	ft. in.
5	7 10½	8 9	9 7½	10 6	12 3	14 0	15 9	17 6	19 3	21	24 6	26 3	28 0	31 6
6	9 4½	10 5	11 5½	12 6	14 7	16 8	18 9	20 10	22 11	25	29 2	31 3	33 4	37 6
7	10 10½	12 1	13 3½	14 6	16 11	19 4	21 9	24 2	26 7	29	33 10	36 3	38 8	43 6
8	12 4½	13 9	15 1½	16 6	19 3	22 0	24 9	27 6	30 3	33	38 6	41 3	44 0	49 6
9	13 10½	15 5	16 11½	18 6	21 7	24 8	27 9	30 10	33 11	37	43 2	46 3	49 4	55 6
10	15 4½	17 1	18 9½	20 6	23 11	27 4	30 9	34 2	37 7	41	47 10	51 3	54 8	61 6
11	16 10½	18 9	20 7½	22 6	26 3	30 0	33 9	37 6	41 3	45	52 6	56 3	60 0	67 6
12	18 4½	20 5	22 5½	24 6	28 7	32 8	36 9	40 10	44 11	49	57 2	61 3	65 4	73 6
13	19 10½	22 1	24 3½	26 6	30 11	35 4	39 9	44 2	48 7	53	61 10	66 3	70 8	79 6
14	21 4½	23 9	26 1½	28 6	33 3	38 0	42 9	47 6	52 3	57	66 6	71 3	76 0	85 6
15	22 10½	25 5	27 11½	30 6	35 7	40 8	45 9	50 10	55 11	61	71 2	76 3	81 4	91 6
16	24 4½	27 1	29 9½	32 6	37 11	43 4	48 9	54 2	59 7	65	75 10	81 3	86 8	97 6
18	27 4½	30 5	33 5½	36 6	42 7	48 8	54 9	60 10	66 11	73	85 2	91 3	97 4	109 6
20	30 4½	33 9	37 1½	40 6	47 3	54 0	60 9	67 6	74 3	81	94 6	101 3	108 0	121 6
25	37 10½	42 1	46 3½	50 6	58 11	67 4	75 9	84 2	92 7	101	117 10	126 3	134 8	151 6
30	45 4½	50 5	55 5½	60 6	70 7	80 8	90 9	100 10	110 11	121	141 2	151 3	161 4	181 6
35	52 10½	58 9	64 7½	70 6	82 3	94 0	105 0	117 6	129 3	141	164 6	176 3	188 0	211 6
40	60 4½	67 1	73 9½	80 6	93 11	107 4	120 9	134 2	147 7	161	187 10	201 3	214 8	241 6
45	67 10½	75 5	82 11½	90 6	105 7	120 8	135 9	150 10	165 11	181	211 2	226 3	241 4	271 6
50	75 4½	83 9	92 1½	100 6	117 3	134 0	150 9	167 6	184 3	201	234 6	251 3	268 0	301 6

TABLES OF DISTANCES AT AND BEYOND WHICH ALL
OBJECTS ARE IN FOCUS.

SIR D. SALOMON'S TABLE.

Focus of Lens in inches.	Ratios marked on Stops.													
	<i>f</i> /7	<i>f</i> /8	<i>f</i> /9	<i>f</i> /10	<i>f</i> /11	<i>f</i> /12	<i>f</i> /13	<i>f</i> /14	<i>f</i> /15	<i>f</i> /16	<i>f</i> /17	<i>f</i> /18	<i>f</i> /19	<i>f</i> /20
	Number of feet after which all is in focus.													
4	19	17	15	14	13	12	11	10	9	9	8	8	7	7
4½	21	19	17	15	14	12	11	11	10	10	9	9	8	7
4⅓	25	22	19	17	16	15	13	13	12	11	10	10	9	9
4¼	27	23	21	19	18	16	15	14	13	12	12	11	10	10
5	30	27	24	21	19	18	17	15	14	14	13	12	11	10
5½	33	29	25	23	21	20	18	17	16	15	14	13	13	12
5⅓	37	31	29	26	23	22	20	19	17	16	15	15	14	13
5¼	39	34	31	28	26	24	22	20	18	18	17	16	15	14
6	43	38	33	31	28	26	24	22	21	20	18	17	16	15
6½	47	41	37	33	30	28	26	24	22	20	20	19	18	17
6⅓	50	45	40	36	33	29	28	26	24	23	21	20	19	18
6¼	55	48	43	39	36	32	30	28	25	24	22	22	21	20
7	58	52	45	42	38	35	31	30	28	26	25	23	22	21

DR. J. J. HIGGINS'S TABLE.

Equivalent Focus.	<i>f</i> /5	<i>f</i> /6	<i>f</i> /7	<i>f</i> /8	<i>f</i> /	<i>f</i> /10	<i>f</i> /11	<i>f</i> /12	<i>f</i> /13	<i>f</i> /14	<i>f</i> /15
5 inches.....	42	35	30	26	23	21	19	17½	16	15	14
5½ "	50½	42	36	32	28	25	23	21	19	18	17
6 "	60	50	43	38	34	30	27	25	23	21	20
6½ "	70½	59	50	44	39	35	32	29½	27	25	23½
7 "	82	68	59	51	45	41	39	34	31	29½	27

Calculated for a Confusion Disc of less than $\frac{1}{100}$ of an inch.



CONTENTS.

TITLE.	BY	PAGE
Actinometer, Using an	Alfred Watkins	773
Albumen Process	1100
Preservatives for Sensitised Albumen Paper	1100
Toning Formulæ for Albumen Prints	1100
Albuminised Paper; How to Prepare it	Horatio Nelson King	726
American Photographic Societies	661
Astigmatic Foci, On the	C. Welborne Piper	764
Bibliography	723
Bromide Prints, Notes on Toning	"Ous."	779
Calendar, 1903	583
Chapters on Photo-Micrography	691
I. Introductory	691
II. Illuminants	693
III. Low-Power Photo-Micrography	698
IV. Stereo - Photo - Micrography, Polariscopic	704
Photo-Micrography, etc.	704
V. "Medium to High-Power Photo-Micrography"	708
Chemical Equivalence of the Alkalies	G. E. Brown	115
Collodio-Bromide Process	1113
Collodio-Chloride Process	1098
Paget Prize Collodio-Chloride Printing-out Paper	1099
Valenta's Formula	1098
Colonial Photographic Societies	654
Continental Photographic Societies	659
Continental Stops and their U.S. Equivalents	1179
Convex Lens, The Use of in Printing	T. Perkins	782
Copying, A Useful Gas Standard for	W. P. Wiseman	744
Cycling with a Camera: A Few Thoughts	H. Selby	749
Developing Formulæ, &c., of the Principal Plate	1122
and Paper Makers	1122
Austin Edwards's Formulæ	1122
Cadett and Neall's Formulæ	1123
Edwards's Formulæ	1126
Elliott & Sons' Formulæ	1129
European Blair Camera Company's Formulæ	1133
Gem Dry Plate Company's Formulæ	1134
Ilford Formulæ	1135
Imperial Company's Formulæ	1140
Kodak Company's Formulæ	1125
Marion's Formulæ	1142
Mawson & Swan's Formulæ	1146

TITLE.	BY	PAGE
Developing Formulæ, &c., of the Principal Plate and Paper Makers (<i>continued</i>):		
Paget Prize Plate Company's Formulæ		1149
"Premier" Dry Plates		1133
Rouch's Formulæ		1154
Sandell Works Company's Formulæ		1154
Thomas's Formulæ		1155
Wratten & Wainwright's Formulæ		1157
Developing Formulæ for Gelatine Dry Plates, &c.		1080
Acetyone Pyro-Developer		1088
Adurol		1089
Amidol		1085
Andresen's Glycin		1083
Diogen		1090
Diphenal		1088
Eikonogen		1085
Ferrous Oxalate		1081
Glycin-Hauff		1083
Hydroquinone		1086
Hydroquinone, Br.		1091
Imogen-Sulphite		1090
Kachin		1089
Metol		1081
Metol-Andresen		1082
Metol-Hauff		1082
Ortol		1088
Para-Amidophenol		1084
Paramidophenol		1084
Pyro and Ammonia		1080
Pyrocatechin		1085
Pyro Soda		1080
Synthol		1091
Developing Hand-Camera Exposures	P. J. Slater	783
Developing Value of the Alkalies	Lt. W. B. Bolton	1159
Ditchwater Photography	J. Dormer	770
Dry Plates, Keeping Properties of	George Ewing, Calcutta	775
Edinol Developer, The—Abolishment of the Combined Toning and Fixing Bath	R. Jahr	737
Enlargers	Lt.-Col. C. Gardner Vatcher	735
Epitome of Progress in 1902		789
Bioscope, The	James Buncle	887
Exposure		881
Half-tone Trichromatic Process, The	F. E. Ives	885
Latent Image, Thoughts Concerning the Nature of the		811
Lumiere Process of Colour Photography, The		894
On the Elimination, by Washing in Water, of Hypo Retained by Photographic Plates and Papers	MM. Lumiere freres and Seywetz	835
On the Radio-Activity of Matter	Mons. Henri Becquerel	867
Opto-Technics	Professor Silvanus P. Thompson	849
Planar, The: With Diminished Secondary Spectrum	Dr. Rudolph	841
Persulphates and their use as Photographic Reagents, The	Hugh Marshall, D.Sc.	862
Reversal of the Photographic Image and its Subsequent Development in Actinic Light	M. I. Wilbert	878
Telephoto Lens and its Measurements, The	Max Loehr	874
Traill Taylor Memorial Lecture, The: Zonal Aberration and its Consequences	Silvanus P. Thompson, D.Sc., F.R.S., F.R.A.S.	787
Equations Relating to Foci, &c.		1186

TITLE.	BY	PAGE
Faintly Printed Prints upon Gelatino-Chloride Papers	J. T. Hackett	738
Ferro-Gallic Process	1102
Eder's Formula	1102
Nakhara's Formula	1103
Uranium Printing	1103
Ferro-Prussiate or Blue Printing Formulae	1101
French Fluid Measures and their Equivalents in English	671
French into English Fluid Measures	672
French into English Weights	672
Gelatine Plates, Intensifying with Silver	G. T. Harris, F.R.P.S.	776
Gelatino-Chloride Process	1092
Alkaline Toning and Fixing Bath	1094
Barker's Formula for Printing-out Emulsion	1092
Beadle's Formula	1093
Black Tones on Gelatino-Chloride Prints	1094
Combined Toning and Fixing Bath	1093
Concentrated Sulphocyanide	1093
Formate Bath	1093
Imperial P.O.P.	1095
Mariona Paper (P.O.P.)	1097
Paget Prize Gelatino-Chloride Printing-out Paper	1096
Platinum Baths for Gelatino-Chloride Papers	1094
Red Tones on Gelatino Chloride	1094
Sylvio Paper	1095
Toning Baths for Gelatino-Chloride Papers	1093
Valenta's Formula	1092
Velox Developers	1095
Glycin, Further Experience with	William Brooks	754
Hypo Eliminators, Clearing Solutions, &c.	1107
Indian Jottings	H. Manners	760
Intensifying with Silver, A Cause of Failure in Interiors, Photographing	H. J. Channon	784
.. ..	R. A. Hamblin	780
Lantern Slide Making Hints, One or Two	Rev. F. C. Lambert	763
Lantern Slides, Warm Tones on	E. J. Steer (Capetown)	762
Leaf Photography	J. H. Baldock, F.C.S.	724
Liquid Light Filters	Arthur Payne, F.C.S.	779
Miscellaneous Formulae	1115
Miscellaneous Information	990
Affiliation of Photographic Societies	1002
Battersea Polytechnic	1017
City and Guilds Examinations	1021
City of Manchester Municipal School of Technology	1029
Copyright (Works of Art) Act (1862)	990
Dark-room Table	1058
Developing Agents, Characteristic Reactions of the known	1059
Exhibition Rules	1051
Freezing Mixtures	1053
Geological Photographs	1070
Goldsmiths' Institute	1017
Goodwill, Some Points in Connection with	1040
Insurance Companies and Exhibitions of Animated Photography	1053
Lantern Illuminants, On the Relative Power of London County Council's Carbide of Calcium Regulation	1056
..	1046

TITLE.	BY	PAGE
Miscellaneous Information (continued):		
London County Council's New Regulations Respecting the use of Cinematograph Lanterns, &c., in Premises Licensed by the Council	1048
London County Council School of Photo- Engraving and Lithography	1012
Northampton Institute	1019
Opto-Technical Section of the Northampton Institute, Clerkenwell	1024
Periodicals, Principal Foreign Photographic	997
Photographic Classes at the London Polytechnics	1012
Photographic Survey and Record of Surrey	1010
Photographic Trades School	1020
Poisons Act	1050
Professional Photographers' Association	998
Professional Photographers' Association, Rules of the	1000
Sizes of Plates, English and Metrical	1054
Studio for a Given Lens, Table for Finding the Minimum Length of	1057
Table for Converting Grains and Drops per ounce into Grammes per litre and <i>vice versa</i>	1074
Table of Poisons and Antidotes	1051
Tella Photographer's Guide to London	1036
Text-Books on Photography, List of the Principal Toning and Fixing Bath	995
Weights and Measures	1052
Weights and Measures, Coins as	1075
Yorkshire Photographic Union	1054
..	1031
Negative Intensifiers	1103
Bromide of Copper	1104
Ferricyanide of Lead	1104
Iodide of Mercury	1104
Lumière's Mercuric Iodide Intensifier	1105
Monckhoven's	1103
Mercury and Ammonia	1104
Mercury with Sodium Sulphite	1104
Uranium	1104
Negative Reducers	1105
Belitzski's	1105
Cyanide Reducing Solution	1105
Farmer's	1105
Namias' Potassium Permanganate	1105
Negative, Reduction of	774
Negatives, Drying	W. H. Walmsley	757
Negative Varnishes, Formulæ for	1108
New Metric Weights and Measures	673
Note or Two, Another	F. J. Mortimer	769
Obituary of the Year	680
Old Processes, Some Erroneous Ideas about	E. W. Foxlee	751
Orthochromatic Processes	1106
Pellet's Process	1102
Hangk's Formula	1102
Sepia Paper (Larus's Formula)	1102
Waterhouse's Formula	1102
Persulphate Reducer, The	G. W. Webster, F.C.S., F.R.P.S.	758
Photographic Societies	615
Photography to other Sciences, The Relations of	Philip E. B. Jourdain	768
Photo-Micrographic Hints, Some	F. Martin Duncan	765
Pocket Compass with the Camera, The Uses of a	J. Tilfor	785
Portrait Photography for Amateurs	J. Leisk	746

TITLE.	BY	PAGE
Portraiture, Excesses in	A. V. Kenah	752
Portraiture, Outdoor	Osborn Thornbery	767
Postal Information	676
Practical Notes and Suggestions of the Year	The Editor	969
Anti-Halation Backings	971
Cold Dark Rooms	975
Combining Negatives: Some of the Methods	978
Control of Development	984
Dark-Room Bench	982
Developer for Hot Weather	981
Double or Combination Printing	976
Dusting-on Process as applied to the Intensifica- tion of Negatives	969
Flashlight Portraiture without Apparatus	986
Glass Positives: Repairing and Copying	974
Glycerine in the Platinum Process	977
Lantern Slides	982
Light Filters for Colour Photography	971
Making Enlarged Negatives in Two Stages	979
Metallic and Other Spots on P.O.P. Prints	987
Mounting Prints	983
Photographing Live Fish	979
P.O.P.	986
Preparing Cracked and Broken Negatives	985
Reduction and Intensification	983
Ruby Glass: A Good Substitute for	987
Sepia Platinotypes by Cold Development	977
Simple and Safe Light for Beginners	986
Simple Way of Focussing Enlargements	989
Toning Baths	972
Toning P.O.P.	985
Use for Empty Lantern Slide Boxes	988
Water Varnish	973
Practical Notes, Some	Edmund J. Mills, D.Sc., F.R.S.	778
Proverbial Photography	777
Recent Novelties in Apparatus, &c.	The Editor	898
Acetylene Apparatus for the Lantern	908
Actinometer for Carbon Printing, A New	940
Allen's Ideal Field Camera and Special Dark Slides	910
"Al Vista" Panoramic Camera	922
American Cameras, Two	924
"Aptus" Panoramic Magazine Hand Camera	967
"Aptus" Supplementary Lenses	933
"Automan" Hand Cameras	925
Brownie Kodak No. 2	923
"Busch" Anastigmatic Lenses	919
"Busch" Patent Pocket Camera Stand	918
Camstand	911
"Challenge" Dayspool Camera	913
Changing Box, An Improved	962
Circular Print Trimmer	940
Collapsing Enlarger, New	963
Cornerpiece	964
Cut Film Hand Camera, A New	939
Cycle Poco Camera, The No. 5	937
"Dalo" Hand Camera	950
Developing Tin for Gum Bichromate Prints	921
Disc Actinometer	957
"Durable" Shutter Release	963
"Ensign," The No. 3 Hand Camera	930
Ever-Ready Portable Oxygen Generator	914
"Fairfield" Cameras	909

TITLE.	BY	PAGE
Recent Novelties in Apparatus, &c. (continued):		
Falloroll Camera		947
Focal Plane Camera		958
Focussing Cooke Lens		957
Folding Pocket Cyko Camera No. 1		921
Folding Pocket Kodak, The No. 0		949
"F.O.P." Camera		932
Frena Camera		911
"Gambler Bolton" Camera		962
Glass-Plate Kodak		954
Guinea Cyko Camera		938
Hinton's Combined Panoramic and Hand Camera		900
Holostigmat Lenses		964
Homocentric Lens		905
"Ilford" Camera		952
Imperial Exposure Reckoner		942
Kammatograph		956
Kodak Developing Machine		943
Lizar's Challenge Model B. Stereoscopic Camera		960
Lowthian Combined Frame		905
Lowthian Quick-Level Tripod Head		900
Lumiere "Colour Photography" Cabinet		906
Magazine Hand or Stand Plate Camera		950
Micrometer, The Kew		904
"Optimus" "Dopfa" Magazine Hand Camera		966
"Optimus" Portrait Lenses for Enlarging		965
"Optimus" Stereoscopic Hand and Stand Camera		964
Oxylith and the Oxygenerator		907
"Palace" Cameras		908
"Penna" Cameras		916
Perfecto Nickelled Steel Tripod		910
Planiscope Lenses		946
Pocket "Poco" Camera		954
Rajar Changer for Flat Films		912
Rayment's Perfected Cantilever Enlarger		966
Reversing Back "Miral" Cameras		901
"Rex" Camera		898
Roll Film Folding "Little Nipper"		951
"Roll Film" Sanderson Hand Camera		941
Scout and Ensign Cameras		920
"Scout No. 1" Daylight Roll Film Hand Camera		928
Stereo-Kodak, The No. 2		935
Stereoscopic Kodak		955
Thornton-Pickard Hand and Stand Cameras		936
"Tribes" Cameras		916
"Tyma" Developing Trough		929
"Vril" Focal Plane Shutter		961
Watkins Daylight Enlarging Test Box		925
Watson's "Vril" Focal Plane Camera		961
"Wizard" Cameras, New		901
"Wizard," Long Focus Cycle S.R.		903
"Wizard" No. 25, The New		902
"Wizard" No. 92, The New		903
"Wizard" Stereoscopic Camera		901
"Wizard," The No. 4 Long Focus		902
"Wizard," The Pocket		903
Relative Exposures for Varying Proportions of Image to the Original		1173
Royal Photographic Society's Standard Diaphragms		1178
Sensitiveness, On	J. Barker	748
Silver Haloids, Solubility of the	E. Valenta	1162
Small Living Subjects, Life-size Snapshots of	Charles Louis Hett	727

TITLE.	BY	PAGE
Standards of the Royal Photographic Society		1181
Suggestions, Two	Rev. J. J. S. Bird, B.A.	755
Surface of Prints, Varying the	A. Lockett	786
Table for Enlargements		1183
Table for the Conversion of English Weights and Measures in the Metrical System		1079
Table of Atomic Weights of 74 Elements	T. W. Richards	1163
Table of Distances for an Object of 68 Inches Height	P. Brosig	1188
Table of Distances for Lantern Projection	E. M. Nelson	1187
Tables of Distances at and beyond which all Objects are in Focus		1190
Table of Symbols and Equivalent Weights of the more Important Compounds used in Photography		1165
Table of View-Angles		
Table of the Solubilities of the Principal Substances used in Photography		1163
Table of the Wave-Lengths of the Principal Fraunhofer Spectrum Lines and the Elements that give them		1172
Tables for the Simplification of Emulsion Calculations		116
Table Showing Displacement on Ground Glass of Objects in Motion	Henry L. Tolman	1180
Table Showing the Hourly Variation in the Sun's Position in Degrees from the South, at Different Seasons of the Year	J. A. C. Branfill	1176
Telephoto Lens	Procella	745
Thermometric Tables		1171
Toning of P.O.P., The	Thos. Stokoe	784
"Uniform System" Numbers for Stops from $\frac{f}{1}$ to $\frac{f}{100}$		1175
View-Angles		1185
Weights and Measures		671
Weights and Measures, about		1077
Wet-Collodion Process		1110
Pyroxyline for Dry-Collodion Processes		1112

CONTRIBUTORS.

Baldock, J. H., F.C.S.	729	Hamblin, R. A.	780
Barker, J.	748	Harris, G. T., F.R.P.S.	776
Bird, Rev. J. J. S., B.A.	755	Hett, Charles Louis	727
Brooks, William	754	Jahr, R.	737
Channon, H. J.	784	Jourdain, Phillip E. B.	768
Davidson, Capt. W. N. Lascelles	772	Kenah, A. V.	752
Dormer, J.	770	King, Horatio Nelson	726
Duncan, F. Martin	765	Lambert, F. C.	763
Ewing, George	775	Lelsk, J.	746
Foxlee, E. W.	751	Lockett, A.	786
Hackett, J. T.	738	Manners, H.	760

Mills, Edmund J., D.Sc., F.R.S. ..	778	Stokoe, Thos.	784
Miortimer, F. J.	769	Thornberry, Osborn	767
"Ons"	779	Tilfor, J.	785
Payne, Arthur, F.C.S.	774	Vatcher, Lieut.-Col. C. Gardner ..	735
Perkins, T.	782	Walmsley, W. H.	757
Piper, C. Welborne	764	Watkins, Alfred	773
"Procella"	745	Webster, C. Watmough, F.C.S., F.R.P.S.	758
Selby, H.	749	Wiseman, W. P.	744
Slater, P. J.	783		
Steer, E. J.	762		

J. H. DALLMEYER, L^{TD}.

Established 1860.

Chairman: THE RT. HON. THE EARL OF CRAWFORD,
K.T., F.R.S. &c.

The Scientific Department under the control of
T. R. DALLMEYER, F.R.A.S., &c., *Managing Director*, and
ST. L. CARSON, B.A. (Cantab.), *Director*.

MANUFACTURERS OF

Photographic Lenses, Cameras and Apparatus OF THE HIGHEST QUALITY ONLY.

SPECIAL ATTENTION GIVEN TO

Foreign and Colonial Orders.

*N.B.—All Goods advertised in this Almanac procured and Shipped
at Manufacturers' Prices.*

Illustrated Catalogue free on Application.

Abridged Catalogue, 16 pp. at end of this Book.

Optical Manufactory : 25, Newman St., London, W.

ARCHER & SONS'

IMPROVED

OPTICAL MAGIC LANTERNS

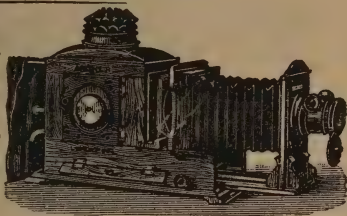
TWO PRIZE MEDALS AWARDED.

Have proved by Public Competition to be superior to all others.

See Reports in the *British Journal of Photography*.

THE 'IDEAL' LANTERN.

The most perfect Single Lantern in the market. Enthusiastic Testimonial from Paul Lange, Esq., G. E. Thompson Esq., F. Anyon, Esq., Manchester Camera Club, and many others. Will show to perfection any distance up to 100 ft. from the screen. Price £8 15s. complete, or Plainer Finish, £6 6s., complete.



THE Lantern of the Future.

The 'Ideal' Dissolver and Carrier Frame.

The most perfect ever invented for Single Lanterns. Highly praised.

Archer's Celebrated 'Blo-thro' Safety Jet, 16s.

Used by members of the 'London Lantern Society,' who say it has just been tried against the 'Ejector,' and other 'Special' Jets, and proved superior to all. (See their Letter.) Price 16s.

The 'Photinus' (Registered).

The most powerful Oil Lantern in the world. Price £4 4s. Full-sized Lanterns from 16s. to £60.

ANIMATED PHOTOGRAPHY.

Large Stock of Apparatus and Films. Exhibitions complete.

Archer's 'Opaque' Lantern Screens.

The Finest Screen extant. See Testimonial from the Manchester Photo Society after trying all others.

NEW SLIDES. Overland Trip to Venice, 72 Slides. Cunard Steamers, 60 Slides. Old Liverpool, New Liverpool, &c., &c.

One of the Finest and Largest Stocks of Slides in the Kingdom, at most Reasonable Prices, Sale or Hire. Slides of Every Description made to Order.

Illustrated Price List, Many Novelties, Post Free, 1d.

✦ ARCHER & SONS, ✦

Lantern Specialists and Manufacturers,

73, LORD STREET, LIVERPOOL

Established 1848.

Dark Room for trying Lanterns, &c. Workshops on the premises.

Photographic Cameras, and all Extras, Lists Free, Post 2d.

Proprietors and Makers of WORMALD'S PHOTO SPECIALITIES.

Telegrams: 'Optic, Liverpool.' Telephone, 5115.

R. W. Thomas & Co.,

LIMITED.



PLATES AND CUT FILMS.

LANTERN PLATES.

ISOCHROMATIC PLATES.



SMALL
PLATES

6d

IN
PACKETS

TWOPENNY TUBES

OF DEVELOPERS AND CHEMICALS,

COLOUR TONING SOLUTIONS,

COLLODION, VARNISH, &c.

Write for full Price List, Free on Application.

R. W. THOMAS & Co., LTD., THORNTON HEATH
NEAR LONDON.

THE STAND OF THE CENTURY.

Ashford's New Patent Adjustable Sliding & Folding Cyclist Stand.

"THE GIRAFFE."

The Tallest, Shortest, Neatest, and most useful
Stand ever invented.

Has no projections whatever.

THE STAND FOR CYCLISTS AND
TRAVELLERS.

**The only 5-foot Stand that
will close into the small
space of $15\frac{3}{4} \times 2\frac{3}{4} \times 2$.**

SIR J. BENJAMIN STONE,
whose reputation is world-wide, says :

"It is excellently made, is firm and service-
able, and it appears to me to be a con-
siderable step in advance, in lightness,
strength, and compactness, qualities which
cannot but be appreciated by the travelling
photographer."

Price of Stand 18/6 each.
Waterproof Cases, Leather
Bound 3/6 "



— THE —

"Newford" Exposing Apparatus

took the Medal at the South London Photographic
Exhibition as the most useful photographic novelty.
Dark slides entirely dispensed with. Any make
films or plates can be used.

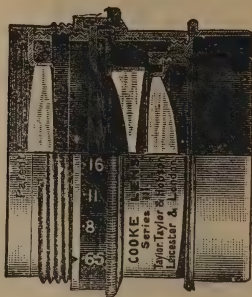
Prices and Full Particulars post free from
Patentee and Manufacturer—

J. ASHFORD, 179, Aston Road, BIRMINGHAM.



COOKE LENSES

Best and Simplest
anastigmats
for fine definition
and rapidity.



Series III.
 $f/6.5$

Series V.
 $f/8$

Focussing COOKE LENSES



FOR
HAND
CAMERAS

Focussing COOKE LENS
Series III. $f/6.5$

See following page.

Prices of COOKE LENSES

	DIMENSIONS ARE (IN INCHES):—					PRICES.	
	Approximate equivalent focus.	Focus measured fr'm flange shoulder.	With large apertures to cover plates.	Diam. of Flange Screw.	Diam. of Hood.	Lens without Flange.	Patent Flange extra.
Series III. Aperture f/6.5	2½	2'2	1½ × 1½	1½	1'15	£2 16 0	2/-
	3	2'75	2½ × 2½	1½	1'15	3 2 0	2/-
	4½	3'9	3½ × 3½	1½	1'15	3 12 0	2/-
	5	4'62	4½ × 3½	1½	1'25	4 0 0	2/-
	5½	4'95	4½ × 3½	1½	1'40	4 5 0	2/-
	6	5'25	5 × 4	1½	1'40	4 10 0	2/-
	7½	6'6	6½ × 4½	1½	1'65	5 10 0	2/-
	8½	7'5	7 × 5	1½	2'1	6 1 0	2/-
Series V. f/8	4½	3'8	3½ × 3½	1½	1'15	2 18 0	2/-
	5	4'5	4½ × 3½	1½	1'15	3 3 0	2/-
	5½	5	4½ × 3½	1½	1'15	3 8 0	2/-
	6	5'5	5 × 4	1½	1'15	3 12 0	2/-
	7½	6'9	6½ × 4½	1½	1'40	4 10 0	2/-
	9	8'3	8 × 5	1½	1'65	5 10 0	2/-
	11	10	8½ × 6½	1½	2'1	7 15 0	2/-
	13	11'95	10 × 8	2	2'5	10 0 0	2/-
	16	15	12 × 10	2½	2'8	15 0 0	2/6
	18	16'45	15 × 12	3	3'3	18 10 0	3/-
	24	22'35	18 × 16	4	4'25	30 0 0	4/-

FOCUSSING COOKE LENSES

Series III. f/6.5	4½	3'9	3½ × 3½	1'25	1'15	£3 17 0	2/-
	5	4'62	4½ × 3½	1'25	1'25	4 5 0	2/-
	5½	4'95	4½ × 3½	1'5	1'40	4 10 0	2/-
	6	5'25	5 × 4	1'5	1'40	4 15 0	2/-
Series V. f/8	4½	3'8	3½ × 3½	1'25	1'15	3 3 0	2/-
	5	4'5	4½ × 3½	1'25	1'15	3 8 0	2/-
	5½	5	4½ × 3½	1'25	1'15	3 13 0	2/-
	6	5'5	5 × 4	1'25	1'15	3 17 0	2/-

Five per cent. discount for cash with order.

TAYLOR, TAYLOR & HOBSON, LTD

STOUGHTON STREET WORKS, LEICESTER.
AND 18 BERNERS STREET, LONDON, W.

also at
NEW YORK.

See preceding page.

O. SICHEL & CO.,

Manufacturers and . . .

Wholesale Dealers of

FORWARD STUDIO CAMERAS,
PREMO CAMERAS,
SICKLE SQUEEGEES,
IDEAL SUPPLEMENTARY LENSES,
SICKLE POSING CHAIRS,
SICKLE HEAD RESTS,
SICKLE HEAD SCREENS,
SICKLE BLOCKING PRESS,
INGENTO STAMPING PRESS,
COLLINS' (American) MOUNTS,
SEAVEY'S BACKGROUNDS,
SCHWARZ BACKGROUNDS,
UNIVERSAL CUTTING MACHINES,
PACKARD BACKGROUNDS,
ROUGH & CALDWELL'S BACKGROUNDS.

NEW DESCRIPTIVE PRICE LISTS TO PROFESSIONAL PHOTOGRAPHERS
AND PHOTOGRAPHIC DEALERS FREE ON APPLICATION.

O. SICHEL & CO.,

52, BUNHILL ROW, E.C.,

Office Telephone :
1613 LONDON WALL.

LONDON.



PHOTOPAKE

(REGISTERED TRADE MARK.)

For Spotting and Blocking out Negatives and Lantern Slides.

INVARIABLE FOR SPOTTING OUT PINHOLES. For blocking out backgrounds. For use in combination printing. For writing title-. For painting artificial clouds. For fancy vignetting and for "shadow effects." For blocking out statuary, groups from street scenes, &c., &c. "PHOTOPAKE" is ready for use. It is smooth as oil and as free from lumps. It dries quickly. It will not chip or crack. One coat will insure absolute opacity. It dries without gloss. It can be applied to unvarnished negatives, and can be washed off under the tap without injury to the film.

Price ONE SHILLING; Post Free, 1s. 1d.

Extra large size, 2s. 6d.; post free, 2s. 9d.

OUR ENTIRE ATTENTION

IS GIVEN TO THE

Manufacture of all sorts of Chemical Preparations for Photographers.

We do not meddle in other departments of the trade, but we give far better value in Developers, Toners, Mountants, Varnishes, &c., &c., than any other house in the world.

A post-card will bring you our New (1903) Illustrated List and "How to Varnish a Negative" (11 diagrams); also "Sulphuric Acid as an Ingredient in Photographic Mountants." Special list of postal rates for parcels abroad also free on request.

DEALERS CAN SUPPLY OUR GOODS

☛ We have confidence in our preparations, therefore, if you do not consider them in every way satisfactory, you may throw them away (you need not return them) and we will refund your money in full. We willingly take all the risk.

The Vanguard Me. Co., Maidenhead, England.

Correspondence invited from all parts of the world.

FITCH'S LATENT FILMS

ORIGINAL

Still unapproachable for speed and general excellence. Gives the best results with every description of Hand and Stand Cameras.

FIRST IN 1888 AND FIRST EVER SINCE.

FITCH'S POSITIVE IVORY FILMS.

FITCH'S PERFECT CINEMATOGRAPH FILM.

Of all . . .
Dealers, and

FITCH & CO., Seldon House, Fulwood's Rents, High Holborn, London, W.C.

DESCRIPTIVE POCKET CATALOGUE POST FREE.

Telegraphic Address: "Discure, London."

W. Watson & Sons

Manufacturers of Highest Class
PHOTOGRAPHIC INSTRUMENTS
AND APPARATUS.

Awarded 42 PRIZE MEDALS for the high quality
of their Instruments.

Including 2 Gold Medals, Paris, 1900; 3 Highest Awards, Chicago, 1893; 2 Gold Medals, Kimberley, 1892; 2 Gold Medals, Paris Universal Exhibition, 1889; the Medal of the Photo Society of India, at Calcutta, 1889; the only Medal for Cameras, and the only Medal for Studio and Tripod Stands, at the Great Photographic Exhibition, Crystal Palace, London, 1888; the only Medal for Photographic Apparatus, Adelaide International Exhibition, 1887; and the only Gold Medal for Photographic Apparatus, Liverpool International Exhibition, 1886.

Nine times placed higher than any other competitor.

W. WATSON & SONS,

. . . *Contractors to His Majesty's Government.* . . .

ESTABLISHED 1837.

✱ **Offices and Warehouse** ✱

313, HIGH HOLBORN, LONDON, W.C.

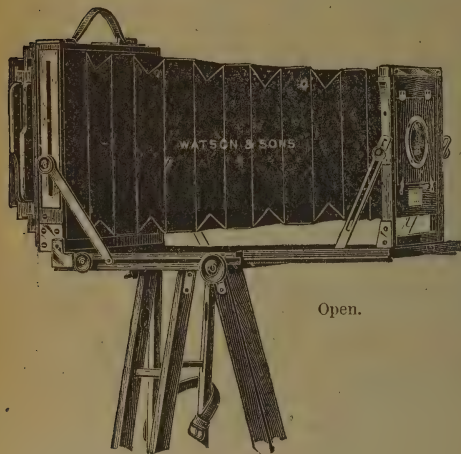
16, FORREST ROAD, EDINBURGH,

and 78, Swanston Street, Melbourne, Australia.

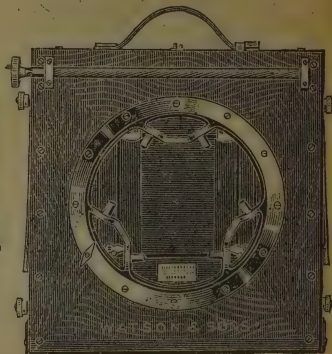
✱ **Steam Factories** ✱

9, 10, 11, 16, & 17, Fulwood's Rents, Holborn, W.C.

WATSON & SONS' "ACME" CAMERAS



Open.



PRICE LIST.

Included with each Camera are three double Dark Slides.

If less or more are required, the cost of separate Slides, as per

Price List page 1237, may be deducted or added.

Nos.	Sizes in inches.	Prices.	Extra for Turntable in base and 3-fold stand.	Extra if all Brass Bound.	Range of Focus in inches.	Best solid Leather Travelling Cases.
		£ s. d.	£ s. d.	£ s. d.		£ s. d.
101	6½ × 4¾	9 12 0	2 2 0	1 10 0	15	1 15 0
102	7½ × 5	10 0 0	2 2 0	1 10 0	17	1 15 0
103	8½ × 6½	12 5 0	2 2 0	1 15 0	19	2 2 0
104	10 × 8	14 0 0	2 10 0	2 0 0	21	2 10 0
105	12 × 10	16 12 6	2 15 0	2 10 0	26	3 0 0
106	15 × 12	21 0 0	3 3 0	3 0 0	33	3 15 0

The Camera may also be had with all the metal fittings of aluminium. For extra cost see next page.

The 8½ by 6½ Camera is also made with an extra wide front and a movable central partition, to use it for stereoscopic pictures, at an extra cost of £1.

For Telephoto work, or for use with heavy lenses, we supply an Ash strut with two hinged joints to attach between the leg of Tripod and front of "Acme" Camera, adjustable to focus, to maintain perfect rigidity. Price, for Cameras up to 10 × 8, 7s. 6d.; 12 × 10 and 15 × 12, 10s. 6d.

(It is necessary to have the Camera to make the fitting.)

NOTE.—The above Prices are subject to 5% Discount for Cash with Order.

W. WATSON & SONS, 313, High Holborn, London, W.C.

And 16, FORREST ROAD, EDINBURGH.

COMPLETE SETS WITH WATSON'S "ACME" CAMERAS & LENSES.

*Any Item not required may be left out from the Set and its cost deducted,
or any single article supplied separately.*

Nos.	108	109	110	111	112	113
SIZES	$6\frac{1}{2} \times 4\frac{1}{4}$	$7\frac{1}{2} \times 5$	$8\frac{1}{2} \times 6\frac{1}{2}$	10×8	12×10	15×12
	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
"Acme" Camera and 3 double slides	9 12 0	10 0 0	12 5 0	14 0 0	16 12 6	21 0 0
Series I. — Holostigmatic Convertible Lens, 3 feet working at f.5	7 5 0	8 12 6	9 10 0	14 0 0	18 0 0	24 0 0
Solid Leather Travelling-case, with Spring Lock	1 15 0	1 15 0	2 2 0	2 10 0	3 0 0	3 15 0
Rotating Turntable in base, and Tripod Stand	2 2 0	2 2 0	2 2 0	2 10 0	2 15 0	3 3 0
Shutter for Time or Instantaneous Exposures with Speed Indicator	0 12 6	0 15 0	0 15 0	0 17 6	0 17 6	1 1 0
	21 6 6	23 4 6	26 14 0	33 17 6	41 5 0	52 19 0

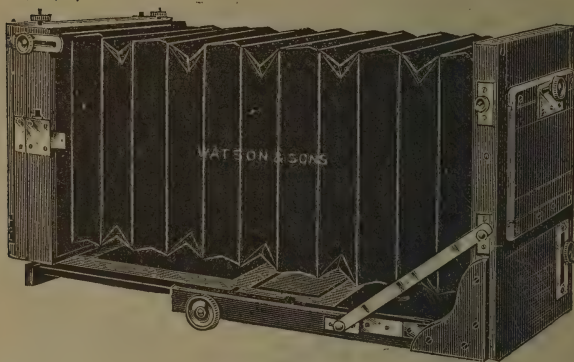
The following additions may be made to the above Sets—

	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Brass binding Camera and Slides	1 10 0	1 10 0	1 15 0	2 0 0	2 10 0	3 0 0
Replacing brass fittings to Camera and Slides by Aluminium	2 10 0	2 10 0	3 0 0	3 10 0	4 0 0	4 10 0
Aluminium mounted Cameras bound with Aluminium for abroad, in similar way to brass binding	1 10 0	1 10 0	1 15 0	2 0 0	2 10 0	3 0 0
Wide Angle Rectilinear Lens for Photographing in confined situations, interiors, &c.	3 17 6	4 10 0	4 10 0	5 10 0	6 15 0	8 5 0
Waterproof Focussing Cloth Completely fitted Chemical Chests, with 2 doz. Dry Plates, and all Accessories	0 7 6	0 7 6	0 7 6	0 7 6	0 10 0	0 10 0
Bright View Finder	0 10 6	0 10 6	0 10 6	0 10 6	0 10 6	0 10 6

The above prices are subject to 5 per cent. Discount for Cash with Order.

W. WATSON & SONS, 313, High Holborn, London, W.C. 1
And 16, FORREST ROAD, EDINBURGH.

WATSON & SONS' PREMIER CAMERAS.



Made with interchangeable parts, so that the dark slides, fronts and screw nuts, made for one Camera will fit any other for the same size Plates, and duplicates can at any time be obtained without the necessity of sending the Camera to be fitted. All the sizes up to and including 10×8 are fitted with LONG FRONT and MOVABLE CENTRAL PARTITION, so that they are available for Stereoscopic work. Larger sizes may also be so fitted if desired. They may also be fitted with a repeating back interchangeable with the reversing frame and exactly similar to that supplied with the Universal Studio Camera to take 2 pictures on one plate. For extra cost see next page. These Cameras are of the

VERY HIGHEST QUALITY AND WORKMANSHIP.

This pattern, originally introduced by us, despite the numerous other forms that have appeared since in the market, still holds its position, and commands a large sale, no pattern having been designed to excel it for strength, durability, and convenience.

[For full description and prices see next page.]

W. WATSON & SONS, 313, HIGH HOLBORN, LONDON, W.C.
And 16, FORREST ROAD, EDINBURGH.

COMPLETE 'PREMIER' OUTFITS.

	139 6½ by 4½		140 7½ by 5		141 8½ by 6½		142 10 by 8		143 12 by 10		144 15 by 12	
	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Camera and 3 double slides ..	9 12 0	10 0 0	8 12 6	9 10 0	12 5 0	14 0 0	14 0 0	16 12 6	18 0 0	21 0 0	24 0 0	24 0 0
Series I., Holostigmatic Con- vertible Lens, 3 foci, working at f/6.5	7 5 0	8 12 6	9 10 0	12 5 0	14 0 0	14 0 0	16 12 6	18 0 0	21 0 0	24 0 0	24 0 0	24 0 0
Solid Leather Travelling Case, with spring lock	1 15 0	1 15 0	2 2 0	2 2 0	2 2 0	2 15 0	2 15 0	2 2 0	2 2 0	2 10 0	2 10 0	2 10 0
Folding Tripod Stand	1 5 0	1 5 0	1 10 0	1 10 0	1 10 0	1 10 0	1 10 0	1 10 0	1 10 0	1 10 0	1 10 0	1 10 0
Time & Instantaneous Shutter, with Speed Indicator	8 12 6	0 15 0	0 15 0	0 15 0	0 15 0	0 17 6	0 17 6	0 17 6	0 17 6	0 17 6	0 17 6	0 17 6
Extra, if Camera and Slides are brass bound for hot Countries	20 9 6	22 7 6	26 2 0	26 2 0	26 2 0	33 2 6	33 2 6	41 16 0	41 16 0	55 6 0	55 6 0	55 6 0
Extra for adding repeating back for portraiture, to take 2 pictures on one plate, as with a Universal Studio Camera ..	1 10 0	1 10 0	1 10 0	1 15 0	1 15 0	2 0 0	2 0 0	2 10 0	2 10 0	3 0 0	3 0 0	3 0 0
Wide Angle Rectilinear Lens for Interiors and close situa- tions	2 0 0	2 0 0	2 0 0	2 10 0	2 10 0	3 3 0	3 3 0	3 10 0	3 10 0	4 0 0	4 0 0	4 0 0
	3 17 6	4 10 0	4 10 0	4 10 0	4 10 0	5 10 0	5 10 0	6 15 0	6 15 0	8 5 0	8 5 0	8 5 0

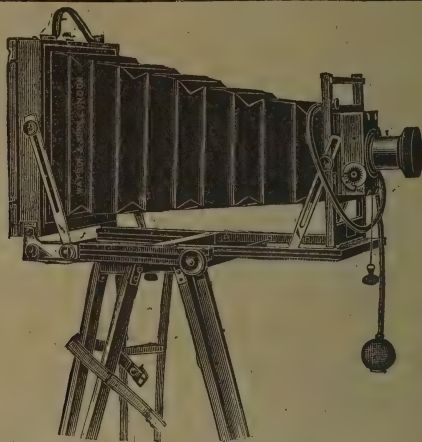
Any item in above estimates may be purchased alone, or left out from the set if desired and cost deducted. The prices are subject to 5 per cent. Discount for Cash with order.

For Slides to Repeating Back, see various sizes in List, page 1237; or if this addition is made at time of purchasing Camera, one of the slides (single or double) supplied may be fitted free of cost to use both in this and the ordinary frame.

For Extra Dark Slides or Inner Frames see p. 1237.

W. WATSON & SONS, 313, High Holborn, London, W.C.; and 16, Forrest Road, Edinburgh.

Watson's "Popular" Outfits.



OUR aim in the design and construction of this Camera has been to place within the reach of Professional Photographers and others a thoroughly serviceable and strongly made apparatus **at a low price.** This Camera, though not possessing the high finish and minuteness of detail to be found in our "Acme" and "Premier" patterns, fulfils the requirements of all kinds of Photography—Portraiture, Landscape, and Architecture. It is made throughout in our own workshops of best and most seasoned materials, and with stout leather, bellows, and it can be relied upon to give entire satisfaction to users.

It has rising motion to front, swing back, long range of focus with rack-work adjustment, and can be used with the shortest focus Lenses.

... PRICE LIST. ...

Complete Outfit, as illustrated, comprising Camera, 3 Double Slides, Rapid Rectilinear Lens, with iris diaphragm, Time and Instantaneous Shutter, with speed indicator, working before or behind the Lens, Tripod and Canvas Case for Camera:—

1-Plate, £9 10 0	Whole Plate, £13 0 0
Camera and 3 Slides only " 6 10 0	" 7 15 0
Brass Binding " 1 5 0	" 1 10 0

The above Camera can also be supplied with Square Bellows, and of rather heavier build (resembling the Premier Camera quoted on page 1210), this form being specially suitable for Professional use, in the undernoted sizes:—

	Half Plate.	12×10.
Camera, including 3 slides	£7 10 0	£13 0 0
Brass Binding	1 10 0	2 10 0

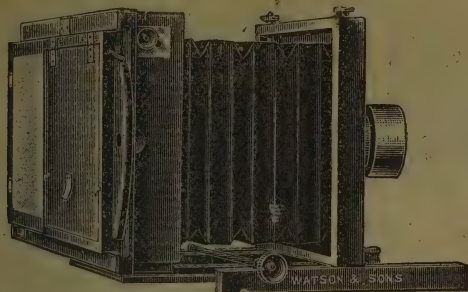
The above Prices are subject to 5 per cent. Discount for Cash with Order.

W. WATSON & SONS, 313, High Holborn, London, W.C.
And 16, FORREST ROAD, EDINBURGH.

WATSON'S UNIVERSAL STUDIO CAMERA.

Of Spanish Mahogany, Leather Bellows Body,
Very Strongest and Best Workmanship.

Will do all the work in a Studio, and, if properly used, last a lifetime.



THIS CAMERA has been specially designed for the Studio. It has bellows body, extending in front by sliding, and at back by rack and pinion, so that it has sufficient range to allow of its being used for the longest or shortest focus lens, and it may be used also for copying. It has swinging back, and takes the size plates quoted either way, horizontal or vertical. The ground-glass screen slides along when the dark slide is put in position.

With one of these Cameras alone all the work of an ordinary studio may be done.

- | | | |
|-----|---|---------|
| 175 | For Plates $6\frac{1}{2} \times 4\frac{1}{2}$. May be used for either two Cartes-de-Visite on one Plate, $6\frac{1}{2} \times 4\frac{1}{2}$, or one single Picture on any size up to and including $6\frac{1}{2} \times 4\frac{1}{2}$, focus from $4\frac{1}{2}$ in. to 18 in. ... | £6 0 0 |
| 176 | For Plates $8\frac{1}{2} \times 6\frac{1}{2}$. With Slide $9\frac{1}{2} \times 8\frac{1}{2}$, taking two $\frac{1}{4}$ -Plates side by side and Carrier to take two $\frac{1}{4}$ -Plates. Length of focus from $5\frac{1}{2}$ in. to 22 in. ... | 7 17 6 |
| 177 | For Plates 10×8 . For two Boudoir Portraits, two Cabinets, or two Cartes-de-Visite, with Carriers for $8\frac{1}{2} \times 6\frac{1}{2}$, and $6\frac{1}{2} \times 4\frac{1}{2}$, focus from 6 in. to 24 in. ... | 8 17 6 |
| 178 | For Plates 12×10 . With Carriers 10×8 , and $8\frac{1}{2} \times 6\frac{1}{2}$... | 10 15 0 |
| 179 | For Plates 15×12 . With Carriers 12×10 and 10×8 ... | 15 15 0 |

These Cameras may be supplied, if required, having double swinging back instead of vertical swing only. Cost would then be extra for 175 and 176, **£1**; 177, **£1 5s.**; 178, **£1 15s.**; 179, **£2**.

Included with each Camera is one single slide and one inner frame, but double slides may be substituted, if preferred, at the difference in cost. For prices see page 1237.

The above Prices are subject to 5 per cent. Discount for Cash with Order.

N.B.—These Cameras can be purchased on W. & Sons' Progressive Payment system, spread over a period of 12 months, particulars of which can be had on application.

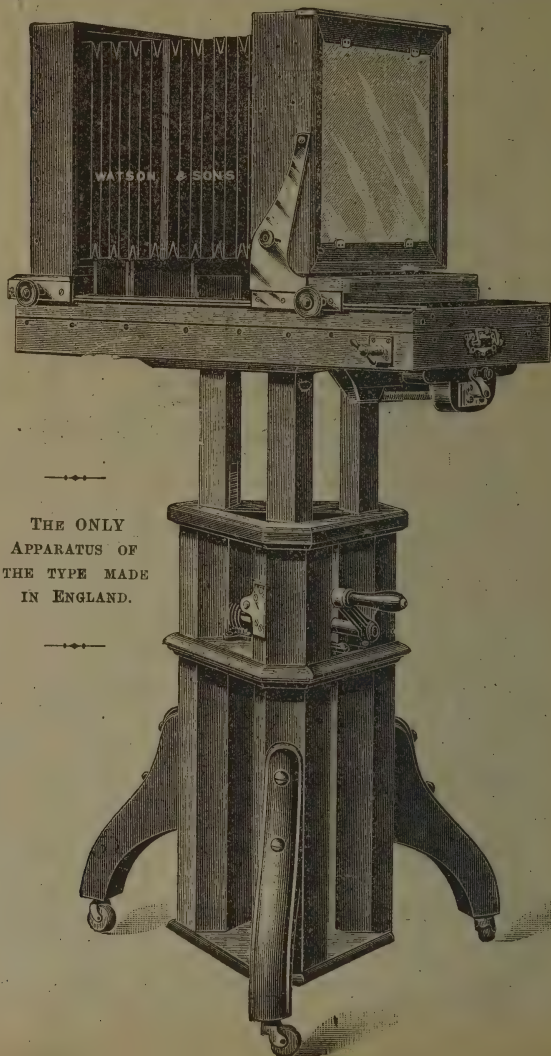
W. WATSON & SONS, 313, High Holborn, London, W.C.

And 16, FORREST ROAD, EDINBURGH.

Watson's New Combination Studio Apparatus

OF BEST BRITISH WORKMANSHIP THROUGHOUT.

THE ONLY
APPARATUS OF
THE TYPE MADE
IN ENGLAND.



FOR PARTICULARS AND PRICES SEE FOLLOWING PAGE.

Perfection in Studio Apparatus.

WE claim for this Camera and Stand that they are in every detail the most perfect, both as regards utility of movements and workmanship, that have yet been put before the Professional Photographer.

The base of the Camera and the top of the Stand are screwed permanently one to the other, so that ABSOLUTE RIGIDITY AND FREEDOM FROM VIBRATION are insured. The Camera can be extended both at back and front, giving very long range of focus.

The gearing for raising and lowering the top of the Stand is of special design, the teeth of all racks and spindles being machine cut, and not cast. The top of the Stand is fitted with tilting motion, working by an endless screw.

The wood throughout is choice mahogany, thoroughly seasoned, and the Stand is of elegant design and very rigid.

The outfit is a handsome addition to the furniture of any Studio.

SPECIFICATION.

A mahogany Camera and Stand as illustrated on preceding page.

Rising and falling motion to the front.

Horizontal and vertical swing to the Back.

Fine adjustment by Rack and Pinion.

(Special twisted Pinion with spiral racks, obviating backlash).

Best Morocco Leather Bellows.

A Slide of choice mahogany, for the full size of plate, having flexible Roller Shutter and fitted with Carrier, adjustable for all sizes down to $8\frac{1}{2}$ by 6 $\frac{1}{2}$.

A separate Glass Frame for focussing, interchangeable with the same.

A Repeating Holder, fitting alternatively in place of the above Slide, with hinged Glass Frame and carrying a Dark Slide $9\frac{1}{2}$ by 6 $\frac{1}{2}$, taking plates $8\frac{1}{2}$ by 6 $\frac{1}{2}$, or two $\frac{1}{2}$ plates side by side and fitted with a Carrier to take two $\frac{1}{2}$ plates side by side.

Full focus of the Camera (size 12 by 10), 4 ft.

Full height of Stand, 4 ft. 5 in.

Height of Stand, racked down, 2 ft. 6 in..

PRICE LIST.

Camera and Stand as per Specification above.

Extra Slide for full size with Roll r Blind Shutter.

12×12	£28 10 0	£3 15 0
15×15	31 10 0	4 5 0
20×20	41 0 0	—
24×24	48 10 0	—

With the two largest sizes we supply our large "Premier" Stand, as on p. 1230.

The above Prices are subject to a Discount of 5 per cent. for Cash with Order.

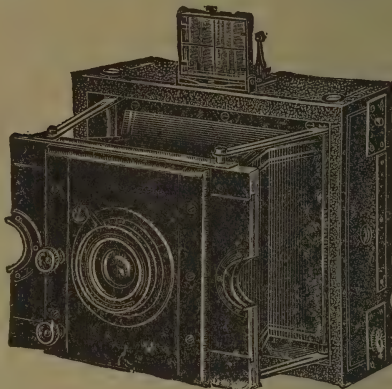
N.B.—These Cameras can be purchased on Watson & Sons' Progressive Payment System—spread over a period of 12 months, particulars of which will be sent on application.

**W. WATSON & SONS, 313, HIGH HOLBORN, LONDON, W.C.
AND 16, FORREST ROAD, EDINBURGH.**

Watson's "Vril" Focal Plane Camera.

NEW FEATURES.

The only
Focal Plane
Shutter giving
Time
and Instant-
aneous ex-
posures up
to $\frac{1}{1000}$ of a
second.



Speeds and
width of slit
regulated
**from the
outside.**

This apparatus consists of a Camera with folding front, which is extended to a fixed distance, as shown in the above illustration, and has mounted upon it a Lens.

The Lens is fitted into a special focussing tube, and the necessary adjustment for objects from 2 or 3 yards to infinity is obtained by simply moving a lever which works the Lens in and out of its mount.

The back portion of the Camera consists of a Focal Plane Shutter of an entirely new pattern, with which **time or instantaneous** exposures can be made at will, the range of instantaneous exposures varying from $\frac{1}{1000}$ th of a second to $\frac{1}{10000}$ th. The Camera is thus available either for use in the hand or on a Tripod.

When not in use the Camera folds quite flat, and measures in $\frac{1}{4}$ -plate size only $8 \times 7 \times 3$. The front of the Camera has rising motion in both horizontal and vertical directions.

The Lens supplied is one of our Holostigmats Series I., working at $f/6.1$.

The Camera is covered with black leather, the uncovered parts, namely, the front and focussing frame, being of ebonised mahogany, and presents a handsome and unobtrusive appearance.

PRICE LIST.

	$\frac{1}{4}$ -plate.	5×4	$\frac{1}{4}$ -plate. Stereoscopic
	£ s. d.	£ s. d.	£ s. d.
Camera as described, including 3 double slides, finder, and Holostigmat Lens in focussing mount, with iris diaphragm...	11 5 0	12 15 0	15 0 0
Leather Case, to carry Camera and 3 slides or changing box	0 13 6	0 15 0	0 17 6
Changing Box to hold 12 plates	2 5 0	2 10 0	3 15 0
24 Film Sheaths (aluminium)	0 10 0	0 10 0	0 10 0
Quickset Tripod of aluminium and wood, light, but very firm	1 1 0	1 1 0	1 1 0
Leather Case for same	0 6 6	0 6 6	0 6 6
Extra cost for slides fitted with flexible roller shutters, per set of 3	0 13 6	0 15 0	1 1 0
Camera as described, with 3 double slides and finder only	5 15 0	6 0 0	7 10 0
Extra Double Slides	0 10 6	0 11 6	0 12 6

The above Prices are subject to **5 PER CENT. DISCOUNT** for Cash with order.

**W. WATSON & SONS, 313, HIGH HOLBORN, LONDON, W.C.
AND 16, FORREST ROAD, EDINBURGH.**

WATSON'S NEW PATTERN CHANGING BOX. FOR PLATES OR FILMS

(As supplied with the "VRIL" FOCAL PLANE CAMERA).



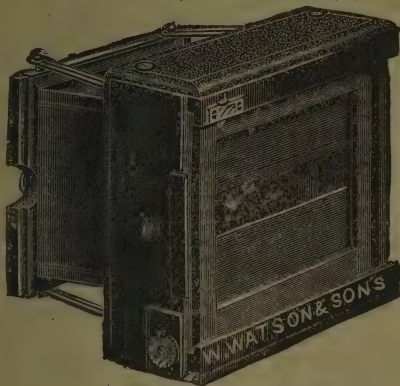
We supply for this Camera a new pattern of Changing Box. In this Box the Plate or Film is changed, no matter what the position of the Box, simply by drawing out the inner portion of the magazine (as shown in the Illustration) and returning it again, the number of the exposure being shown through a small red disc in the under side. This Changing Box can be adapted to other makes of Cameras, the prices being as in the list on preceding page. The Box can be used either with Plate or Film Sheaths.

A small charge is made for adapting, varying according to the work involved.

For prices see preceding page.

WATSON'S NEW TIME OR INSTANTANEOUS FOCAL PLANE SHUTTER

(As fitted to the "VRIL" CAMERA).



We are prepared to supply for use with other Cameras the same pattern of Shutter as is fitted to this new Hand Camera. It is unquestionably the most convenient form of the now popular Focal Plane Shutter, and being arranged to give Time as well as Instantaneous exposures, enables the user to dispense with the ordinary Time Shutter entirely. The method of adjusting the width of slit in the blind for instantaneous exposure is extremely simple, and the exact width of the slit is shown on a dial at the side of the Shutter. We have tested the mechanism very severely and can confidently recommend the Shutter as not likely to get out of order.

PRICE LIST.

1-plate—£2 12 6 ... 5×4—£2 17 6 ... 1-plate—£3 7 6

Fitting to Cameras of other makes than our own is extra, and is charged according to the time occupied.

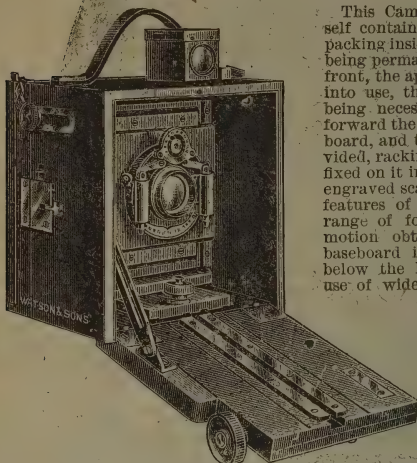
The above Prices are subject to 5 per Cent. Discount for Cash with Order.

W. WATSON & SONS, 313, High Holborn, London, W.C.
And 16, FORREST ROAD, EDINBURGH.

WATSON'S "ALPHA" CAMERA.

Improved Form. Latest Pattern.

The best form for Hand or Tripod. Finest quality throughout.



This Camera is of box form and is entirely self contained—lens, shutter, and finder all packing inside the body. The lens and shutter being permanently in position on the camera front, the apparatus can be instantly brought into use, the operation of focussing alone being necessary. This consists in drawing forward the front to a fixed stop on the base-board, and then by means of the pinion provided, racking the base out until the pointer fixed on it indicates the correct focus on an engraved scale, let into the base. The chief features of the Camera are—its very long range of focus, and the amount of rising motion obtainable in the front, while the baseboard is also made (as shown) to fall below the horizontal, thus permitting the use of wide-angle lenses. The Camera has reversing back, so that either horizontal or vertical pictures may be taken without changing the position of the Camera, and a swinging back. The materials employed are of the most seasoned and highest quality, and the workmanship is the best it is possible to obtain.

We can recommend this Camera with the utmost confidence to our customers both at home and abroad.

PRICE LIST.

SIZES	1-PLATE.	5x4	1-PLATE.
	£ s. d.	£ s. d.	£ s. d.
Camera with Rising Front, Double Extending Base, Swing Back and Rackwork Focussing Adjustment, Reversing Frame, and 3 Double Dark slides	7 0 0	7 15 0	9 0 0
Holostigmat Convertible Lens, 3 foci, Iris Diaphragm	5 10 0	6 7 6	7 5 0
Time and Instant Shutter with speed indicator and trigger release	0 15 0	0 15 0	0 15 0
Finder	0 10 6	0 10 6	0 10 6
Best Solid Leather Travelling Case, with lock and key	1 4 6	1 7 6	1 14 0
	15 0 0	16 15 6	19 4 6
Extra if Camera and Slides are Brass Bound for hot climates	1 2 0	1 5 0	1 10 0
Extra for Leather Covered Body and Bronzed Mounts	0 12 6	0 15 0	0 18 0
Aluminium instead of Brass Mounts	0 18 6	1 1 0	1 3 6
Aluminium Binding in similar manner to Brass Binding —supplied only to Aluminium Mounted Camera	1 2 0	1 5 0	1 10 0

Extra cost of Bausch and Lomb Diaphragm Shutter, "Unicum," working between the Lenses. $\frac{1}{4}$ -plate, 15/-, 5x4 and $\frac{1}{4}$ -plate, 10/-.

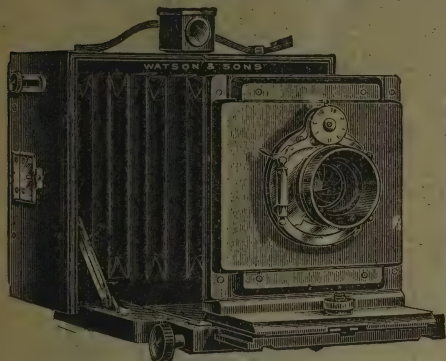
For prices of Rapid and Wide-Angle Rectilinear Lenses see pp. 1209 and 1224.

The above Prices are subject to 5 per cent. Discount for Cash with Order.

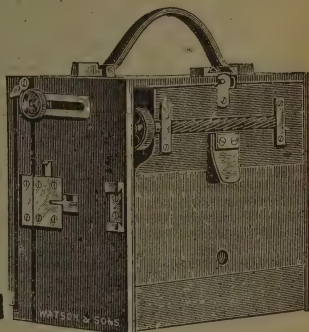
W. WATSON & SONS, 313, High Holborn, London, W.C.

And 16, FORREST ROAD, EDINBURGH.

WATSON'S ALPHA HAND CAMERAS.



OPEN.



CLOSED.

THIS Camera, though ostensibly for use in the Hand, is equally available for Tripod use, and is fitted with all movements required for both Architectural and Landscape Photography, including Double action Front, Double Extending Base, Swing Back and Rackwork Adjustment, the range being sufficient to allow of a single combination of the Rapid Rectilinear Lens supplied being used alone for distant views. These Cameras, both alone, and in complete sets as listed, are kept in stock ready for immediate delivery.

COMPLETE OUTFITS.

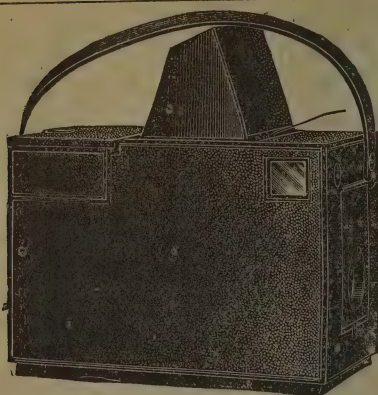
No. SIZES	ENGLISH.			CONTINENTAL.	
	181 1-plate.	182 5×4	183 6½×4½	184 9×12 c/m.	185 13×18
	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Camera, with Double Action Front, Double Extending Base, Swing Back and Rackwork Focussing Adjustment, and 3 Double Dark Slides	6 10 6	7 1 6	8 5 6	7 1 6	8 15 6
Rapid Rectilinear Lens, with Iris Diaphragm	2 17 6	3 2 6	4 0 0	3 2 6	4 10 0
Time and Inst. Shutter	0 15 0	0 15 0	0 15 0	0 15 0	0 15 0
Finder	0 10 6	0 10 6	0 10 6	0 10 6	0 10 6
Best Solid Leather Travelling Case, with Lock and Key	1 2 0	1 5 0	1 10 0	1 5 0	1 10 0
	11 15 6	12 14 6	15 1 0	12 14 6	16 1 0
Extra if Camera and Slides are Brass Bound for hot climates	1 2 0	1 5 0	1 10 0	1 5 0	1 10 0
Extra for Leather Covered Body and Bronzed Mounts	0 12 6	0 15 0	0 18 0	0 15 0	0 18 0
Aluminium instead of Brass Mounts	0 18 6	1 1 0	1 3 6	1 1 0	1 5 6
Aluminium Binding (similar to Brass Binding)	1 2 0	1 5 0	1 10 0	1 5 0	1 10 0

The new Hologstigmatic Lenses can be fitted to these Cameras. For prices see p. 1223.
Extra cost of Unicum Iris Shutter working between the Lenses,

1/4 and 5×4 sizes, 10/-, 1/2 plate, 15/-.

The above prices are subject to 5 per cent. Discount for Cash with Order

**W. WATSON & SONS. 313, HIGH HOLBORN, LONDON, W.C.
And 16, FORREST ROAD, EDINBURGH.**



The "VANNECK" HAND CAMERA

For Plates or Films.

MADE in two sizes, the one to hold 12 glass plates $4\frac{1}{4} \times 3\frac{1}{4}$ in., and the other to hold either a magazine containing 12 glass plates $3\frac{1}{4} \times 3\frac{1}{4}$ in., or a roll-holder for films of the same size.

The Camera is fitted with a large Finder of the reflecting type, in which objects are seen, *actual size, and can*

be focussed up to the moment of exposure, the adjustment being made by a rack and pinion fitted in the base of the Camera.

The Finder is fitted with a folding shade which effectually shuts out surrounding light, and when not in use lies flat on the Camera.

The Shutter gives instantaneous or time exposures at will, the speeds of the former being shown on a scale provided. For time exposures the Camera can be fixed on a tripod. The twelve plates or films are carried in the back of the Camera, and are changed by means of a lever, which raises them into a bag, at the same time recording the number of the exposure.

The range of focus over which objects can be photographed extends from two feet to infinity; and, as exact focussing can be done in the Finder, the Camera is available for large size studies of objects indoors, or for making small reproductions of larger pictures.

MADE IN TWO QUALITIES.

BEST.—Covered in morocco, woodwork of Spanish mahogany, finished throughout in first-class manner, and fitted with finest Rapid Rectilinear Lens, with Iris diaphragm.

SECOND.—Covered in sole leather, woodwork of seasoned white wood, well finished throughout, and complete with Rapid Rectilinear Lens, with Iris diaphragm.

PRICE LIST.

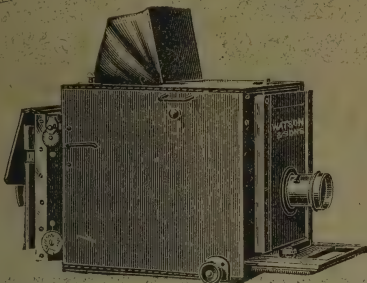
Best quality "Vanneck," $\frac{1}{4}$ -plate size	...	...	...	£10 10 0
Extra for 24 Film Sheaths	...	...	...	0 10 0
Second quality "Vanneck," $\frac{1}{4}$ -plate size	...	...	...	7 0 0
Best quality "Vanneck," for plates $3\frac{1}{4} \times 3\frac{1}{4}$ (Intern side size)	...	...	...	9 10 0
Best quality, but fitted with Eastman Roll-Holder, carry- ing 70 exposures	...	...	...	10 0 0
Solid Leather Case, with lock, $\frac{1}{4}$ plate	...	...	...	1 2 0
Ditto, ditto, $3\frac{1}{4} \times 3\frac{1}{4}$	...	...	...	1 0 0
Mail Canvas Case, either size	...	...	...	0 15 0

Prices are subject to 5 per cent. Discount for Cash with Order.

W. WATSON & SONS, 313, High Holborn, London, W.C.
And 16, FORREST ROAD, EDINBURGH.

THE IMPROVED "GAMBIER BOLTON" CAMERA FOR HAND OR TRIPOD.

A Practical Camera worked out by a Practical Man. A boon to all serious workers in Artistic and Scientific Photography.



PRINCIPAL FEATURES.
Full sized Finder, showing the whole Picture either horizontal or vertical. Reversing Back, Focal Plane Shutter for Time or Instantaneous Exposures, Automatic Release. One Lens only required.

New Features. Reduced Dimensions. Time and Instantaneous Focal Plane Shutter.

This Camera has been designed specially for Press Work, Natural History, and other subjects, the natural attitudes of which can only be secured from a distance. The chief points in the Camera are: a Finder, giving the whole picture, actual size, either horizontally or vertically, and in which the image can be focussed, very long extension, permitting of the full use, both of long-focus Lenses, and of a Telephoto attachment, a reversing frame at the back of the Camera so that either horizontal or vertical pictures can be taken without change of position or loss of the use of the Finder. The Shutter is our new Focal Plane pattern giving time and Instantaneous exposures as described on page 1216, and is discharged automatically by the action of raising a Mirror which reflects the image from the Lens on to the Finder. This Mirror is silvered on the surface, thus giving an absolutely true image, and is coated with a very thin solution of celluloid to protect the silver surface. The construction of the Camera necessarily limits it to use with long-focus Lenses, the shortest focus available being in the $\frac{1}{2}$ -plate size, $9\frac{1}{2}$ inches: 5×4 , $7\frac{1}{2}$ inches; and $\frac{3}{4}$ -plate, 7 inches.

The Camera has rising motion to the front and can be used on a Tripod in the ordinary way for time exposures.

PRICE LIST.

SIZE OF PLATE.	$4\frac{1}{2} \times 3\frac{1}{2}$	5×4	$6\frac{1}{2} \times 4\frac{3}{4}$
Camera, complete with Focal Plane Shutter	£9 10 0	£10 0 0	£11 15 0
Double Slides, each	0 15 0	0 17 0	1 0 0
Holostigmatic Lens, f-6.5, with 3 foci of $14\frac{1}{2}$, $12\frac{1}{2}$, and $7\frac{3}{4}$; $14\frac{1}{2}$, $12\frac{1}{2}$, and $7\frac{3}{4}$; $17\frac{1}{2}$, $14\frac{1}{2}$, and $9\frac{1}{2}$	8 12 6	8 12 6	11 15 0
Dallmeyer Tele-photographic attachment, increasing the magnification about four times	4 10 0	4 10 0	5 5 0
New Model changing-box for 12 plates or films	2 5 0	2 10 0	3 15 0
Canvas Case, with lock	1 5 0	1 7 6	1 12 6

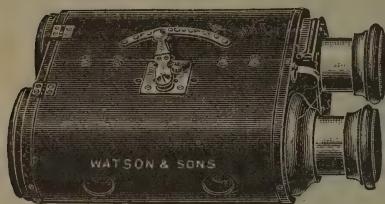
Customers' own Lenses of suitable focus can also be adapted.

The above Prices are subject to 5 per cent. Discount for Cash with Order.

W. WATSON & SONS, 313, High Holborn, London, W.C.
And 16, FORREST ROAD, EDINBURGH.

Watson's Stereoscopic Binocular Camera.

THE ONLY REAL DETECTIVE CAMERA.



POSITION IN USE.

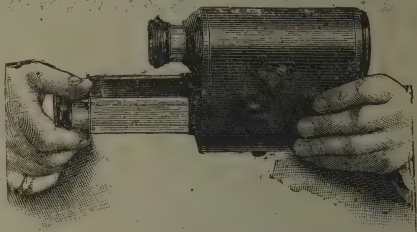
As will be seen from the illustration, this Camera resembles in appearance and size an ordinary Binocular Glass, and when taking a picture it is applied to the eyes in a precisely similar manner. It differs, however, from any other camera, in that it in no way betrays its purpose, *the picture being taken from the side and not from the end of the apparatus*. Thus it is possible to approach quite near to any object that it is desired to photograph, without detection. The Camera is fitted with a pair of lenses, by means of which the stereoscopic images are taken.

When viewed in a stereoscope, the pictures present to the eye all the force and reality of the original objects taken.

The shutter provides varying exposures the speeds of which are engraved on the arc on the Camera body: time exposures can also be made, the Camera at such times being rested on a table or attached to a tripod.

The plates, twelve in number, measure 5×2 , and are contained in a magazine fitted into one of the tubular bodies of the Camera, and are changed by drawing out and replacing the magazine, as shown (fig. 3). This action automatically records the number of the exposures made.

By obscuring one of the lenses, 24 single pictures can be taken, if desired.



PRICE LIST.

Stereoscopic Binocular Camera, fitted with pair of first quality Rapid Rectilinear Lenses, and with sling case complete	£11 10 0
Lumière Plates, coated on extra thin glass for Negatives, per dozen	0 2 0
Transparency Plates for Positives, per dozen	0 1 3
Printing Frame for making Stereoscopic Transparencies without having to divide and remount them	0 6 0
Hand Stereoscope, best quality for viewing Positives, with focussing adjustment	0 15 0
Ditto, ditto, fitted with adjustable Eye-pieces, to suit varying widths of eyes	1 5 0
Mahogany Pedestal Stereoscope, taking 50 views	3 3 0
Enlarging Apparatus—to full Stereoscopic size, $6\frac{3}{4} \times 3\frac{1}{2}$	3 15 0
Set of three enamelled Iron Washing Tanks (nesting) labelled Developer, Alum, and Hypo, each with rack to hold 12 plates	1 1 0

The above Prices are Net for Cash with Order.

W. WATSON & SONS, 313, High Holborn, London, W.C.,
And 16, FORREST ROAD, EDINBURGH.



Reduced from a Negative taken with $6\frac{1}{2}$ -in. ($\frac{1}{2}$ -plate) Holostigmat Lens. on an $8\frac{1}{2} \times 6\frac{1}{2}$ plate, stop f/16.

W. WATSON & SONS, 313, High Holborn, London, W.C.



Reduced from a Negative taken with $6\frac{1}{2}$ -in. ($\frac{1}{3}$ -plate) Holostigmat Lens, on an $8\frac{1}{2} \times 6\frac{1}{2}$ plate, stop $f/11$.—Front raised one inch.

W. WATSON & SONS, 313, High Holborn, London, W.C.



Reduced from a Negative taken with the **Front Combination of a $\frac{1}{2}$ -plate Holostigmat Lens**, on an $8\frac{1}{2} \times 6\frac{1}{2}$ plate, with full aperture of diaphragm.
Front raised one inch.

W. WATSON & SONS, 313, High Holborn, London, W.C.



Reduced from a Negative taken with the **Back Combination of a $\frac{1}{2}$ -plate Holostigmat Lens**, on an $8\frac{1}{2} \times 6\frac{1}{2}$ plate, with full aperture of diaphragm.

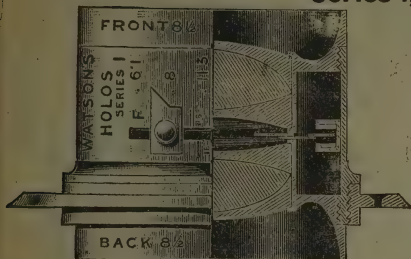
Front raised one inch.

W. WATSON & SONS, 313, High Holborn, London, W.C.

WATSON'S HOLOSTIGMAT CONVERTIBLE LENS

Series I, f-6.1.

BRITISH MANUFACTURE.



An universal Lens, extremely rapid, absolutely achromatic; free from astigmatism or distortion, and possessing magnificent defining power.

Perfect either as Doublets at f-6.1 or as single Combinations f-11.5.

UNEQUALLED IN PERFORMANCE.

MODERATE IN COST.

No.	Single Lenses. Aperture f-11.5.		Combined Focus.	Working Aperture.	Size of Plate.	Covering with Medium Stop.	Prices with Iris Diaphragm.		
	Focus of Front.	Focus of Back.					£	s.	d.
1	7 $\frac{1}{4}$	6	4	f-6.5	4 × 3	5 × 4	4	10	0
2	7 $\frac{1}{4}$	7 $\frac{1}{4}$	4 $\frac{1}{4}$	f-6.1	4 $\frac{1}{4}$ × 3 $\frac{1}{4}$	5 $\frac{1}{2}$ × 4 $\frac{1}{2}$	5	0	0
3	8 $\frac{1}{2}$	7 $\frac{1}{4}$	4 $\frac{1}{2}$	f-6.5	4 $\frac{1}{2}$ × 4 $\frac{1}{2}$	6 × 4 $\frac{1}{2}$	5	10	0
4	8 $\frac{1}{2}$	8 $\frac{1}{2}$	5	f-6.1	5 × 4	6 $\frac{1}{2}$ × 4 $\frac{3}{4}$	6	0	0
5	10 $\frac{1}{4}$	8 $\frac{1}{2}$	5 $\frac{1}{2}$	f-6.5	5 $\frac{1}{2}$ × 4 $\frac{1}{2}$	7 × 5	6	7	6
6	10 $\frac{1}{4}$	10 $\frac{1}{4}$	6	f-6.1	6 × 5	8 × 6	6	15	0
7	12 $\frac{1}{4}$	10 $\frac{1}{4}$	6 $\frac{1}{2}$	f-6.5	6 $\frac{1}{2}$ × 4 $\frac{3}{4}$	8 $\frac{1}{2}$ × 6 $\frac{1}{2}$	7	5	0
8	12 $\frac{1}{4}$	12 $\frac{1}{4}$	7	f-6.1	7 × 5	9 × 7	7	15	0
9	14 $\frac{1}{2}$	12 $\frac{1}{4}$	7 $\frac{3}{4}$	f-6.5	8 × 6	10 × 8	8	12	6
10	14 $\frac{1}{2}$	14 $\frac{1}{2}$	8 $\frac{1}{2}$	f-6.1	8 $\frac{1}{2}$ × 6 $\frac{1}{2}$	11 × 9	9	10	0
11	17 $\frac{1}{4}$	14 $\frac{1}{2}$	9 $\frac{1}{4}$	f-6.5	9 × 7	12 × 10	11	15	0
12	17 $\frac{1}{4}$	17 $\frac{1}{4}$	10	f-6.1	10 × 8	13 × 11	14	0	0
13	20 $\frac{1}{2}$	17 $\frac{1}{4}$	11	f-6.5	11 × 9	14 × 11	16	0	0
14	20 $\frac{1}{2}$	20 $\frac{1}{2}$	12	f-6.1	12 × 10	15 × 12	18	0	0
15	24 $\frac{1}{2}$	20 $\frac{1}{2}$	13	f-6.5	13 × 11	16 × 13	21	0	0
16	24 $\frac{1}{2}$	24 $\frac{1}{2}$	14	f-6.1	15 × 12	18 × 16	24	0	0
17	29	24 $\frac{1}{2}$	15 $\frac{1}{2}$	f-6.5	16 × 13	20 × 16	28	0	0
18	29	29	17	f-6.1	17 × 14	22 × 18	32	0	0
19	34 $\frac{1}{2}$	29	18 $\frac{1}{2}$	f-6.5	18 × 16	24 × 20	37	0	0
20	34 $\frac{1}{2}$	34 $\frac{1}{2}$	20	f-6.1	20 × 18	26 × 22	42	0	0

The above prices are subject to a Cash Discount of 5 per Cent.

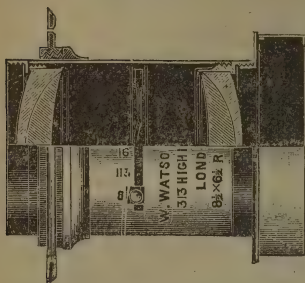
Sir WM. HUGGINS, F.R.S., writing on January 14th, says:—"I have tried the Holostigmatic Lens, which I find very satisfactory, and superior to the Lens I have been using."

Photography, July 18th, 1901, speaking of tests made with a half-plate Lens, says:—"With this stop (f/6.4) it could be got to cover a whole plate easily with good definition, and on a 10 × 8 only the extreme corners were unilluminated. . . . while in the matter of distortion the image of a straight line falling right upon the margin of the plate did not vary from the straight more than 1-100th of an inch in its whole course. We could not wish to own a better instrument."

W. WATSON & SONS, 313, High Holborn, London, W.C.

And 16, FORREST ROAD, EDINBURGH.

WATSON'S PHOTOGRAPHIC LENSES



RAPID RECTILINEARS.

SUITABLE FOR

**Groups, Land'scape, or
Architectural Work.**

Angle of View 50°. Aperture $f/8$.

In Rigid Mounts.

If with Iris
Diaphragm
instead of
Waterhouse
stops. Aluminium
Mounts
with Iris
Diaphragm.

Sizes of Plates.		Dia- meter.	Equiv. Focus.	Prices.	
English In.	Centimetres.				
190 4 1/2 by 3 1/2	...	1 1/4 in.	5 in.	£2 17 6	£3 12 6
191 5 " 4	12 by 9	1 " "	6 " "	3 2 6	3 17 6
192 6 1/2 " 4 1/2	16 " 12 1/2	1 1/4 " "	8 " "	4 0 0	5 0 0
193 8 " 5	18 " 13	1 1/2 " "	8 1/2 " "	4 10 0	5 10 0
194 8 1/2 " 6 1/2	21 " 15	1 3/4 " "	11 " "	5 0 0	6 5 0
195 10 " 8	24 " 18	2 " "	13 1/2 " "	6 15 0	8 5 0
196 12 " 10	30 " 24	2 1/4 " "	16 " "	8 15 0	10 15 0
197 15 " 12	33 " 27	2 3/4 " "	20 " "	11 10 0	14 0 0
198 18 " 16	40 " 30	3 " "	24 " "	16 0 0	19 10 0
199 22 " 20	...	3 3/4 " "	30 " "	23 10 0	28 10 0

Nos. 190 and 191 may be had accurately paired for Stereoscopic work.

The substitution of Aluminium for Brass Mount effects a saving in weight of about
40 per cent.

WATSON'S STANDARD PORTRAIT LENSES

AS SUPPLIED WITH OUR STUDIO OUTFITS.

Working Aperture $f/4$. The most popular Lenses for Studio Portraiture.				Price.	
Size of Plate.		Diameter.	Focus.	With Rack and Pinion and Water- house Stops.	Rigid Mount with Iris Diaphragm.
C.-D.-V., 5 x 4	...	2 1/4 in.	6 m.	£4 15 0	£5 5 0
Cabinet, 6 1/2 x 4 1/2	...	2 1/2 "	8 "	7 0 0	7 15 0
" 8 1/2 x 6 1/2	...	3 "	10 "	9 10 0	10 10 0

NOTE.—The above Prices are subject to 5 per cent. Discount for Cash with Order.

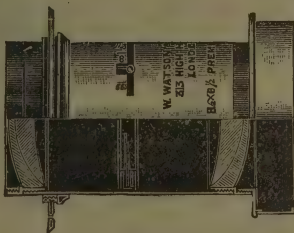
W. WATSON & SONS, 313, HIGH HOLBORN, LONDON, W.C.,
And 16, Forrest Road, Edinburgh.

WATSON'S "PREMIER" LENSES.

These Lenses, which have a working aperture of $f\ 5\cdot6$, are twice the rapidity of the Rapid Rectilinear type, and are specially suited for Portraits and Groups in the Studio, or for the very rapid exposures made with a focal plane shutter. Stopped down to the focal aperture of a Rapid Rectilinear they are useful for all general work. They have great depth of focus with a very flat field.

IN RIGID MOUNTS, WITH IRIS DIAPHRAGM.

Nos.	Sizes of Plates.	Diameter.	Equiv. Focus.	Mounted in Brass.	Aluminium.
	English Ins. Centimetres.	1½ in.	6 in.	Prices.	Prices.
200	5 × 4	1½	8	£5 15 0	£6 10 0
201	6½ × 4½	1½	8	£6 10 0	7 10 0
202	8½ × 6½	2½	11	8 10 0	9 10 0
203	10 × 8	2½	13	11 10 0	13 0 0
204	12 × 10	3	16	15 0 0	17 0 0
205	15 × 12	3½	20	23 0 0	26 0 0



WATSON'S WIDE-ANGLE RECTILINEARS.

Embracing an angle of about 100° , and necessary in cases where it is impossible to get any distance from the object to be photographed, and for interiors and use in confined situations.

Nos.	Sizes of Plates.	English Ins. Centimetres.	Equiv. Focus.	With Rotating Stops.	With Iris Diaphragm.	Aluminium Mounts with Iris Diaphragm.
				£ s. d.	£ s. d.	£ s. d.
206	5 × 4	13 × 18	3 in.	8 0 0	8 7 6	4 0 0
207	6½ × 4½	21 × 15	4	3 10 0	3 17 6	4 10 0
208	8½ × 6½	24 × 18	5½	4 0 0	4 10 0	5 5 0
209	10 × 8	30 × 24	6	5 0 0	5 10 0	6 5 0
210	12 × 10	33 × 27	8½	6 0 0	6 15 0	7 15 0
211	15 × 12	33 × 27	10	7 10 0	8 5 0	9 10 0
212	18 × 16	33 × 27	14	10 10 0	11 10 0	13 0 0



No. 206 may be had accurately paired for Stereoscopic work.

NOTE. The above prices are subject to 5 per cent. Discount for Cash with Order.

W. WATSON & SONS, 313, HIGH HOLBORN, LONDON, W.C.
AND 16, FORREST ROAD, EDINBURGH.



THE AEROGRAPH.



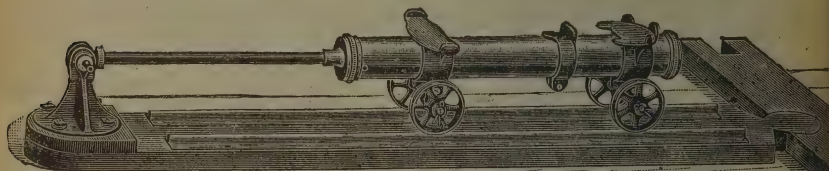
PATTERN A.

Indispensable for Finishing **CARBON** or **BROMIDE** WORK
(either on Opal or Paper), and **PLATINOTYPES**,

Saves one-half the time and yields most pleasing Results.

Invaluable for correcting imperfect **Vignettes**, or introducing **Back-grounds**; for "Stopping-out" in the shadows of thin **Negatives**, &c.

The Air-Pump (illustrated) supplies air with the least possible exertion on the part of the operator, and the reservoir will store sufficient to enable him to work with the hand-piece for some time without touching the pump.



FRANKLIN & CO. CHICAGO

PRICE.

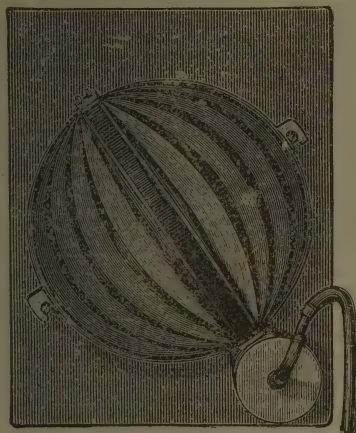
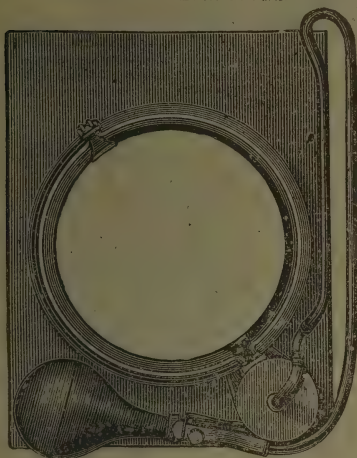
"Aerograph," pattern A (hand-piece only)...	...	...	£5 10 0
Foot Pump (as illustration), with air reservoir and connections	...	...	1 14 6
Air Gauge	...	...	0 2 6
"Aerograph," pattern A, complete	...	...	£7 7 0

These Prices are Net for Cash with Order.

W. WATSON & SONS, 313, HIGH HOLBORN, LONDON, W.C.
And 16, Forrest Road, Edinburgh.

WATSON'S STUDIO SHUTTER.

NOW FITTED WITH "DURABLE" DISCHARGER.



The most efficient and satisfactory Shutter for use in the Studio, noiseless and without vibration.

THE Shutter which is here shown, closed and open, consists of a metal ring to which are attached two leather bellows, which close together, forming a hemisphere.

The action of opening and shutting is done by means of a pneumatic ball; the movement is perfectly noiseless; the pressing of a lever by the side of the ball keeps the shutter permanently open for focussing; on raising the lever the shutter again closes and is ready for use.

We now fit to these shutters the "Durable" Discharger (particulars of which are given on page 1229) dispensing with the use of the expanding bellows which, under hard wear is in course of time apt to leak, sometimes shortening the exposure without the operator's knowledge. This was *the* weak point of an otherwise perfect shutter, and now that it is removed we claim that the shutter is **absolutely perfect**. The drawing wire cannot fail to open the shutter, and when the knobs are brought together a slight turn of one of them locks the shutter open (for focussing and long exposures) and there is no possibility of its gradually closing unawares.

The "Durable" can be fitted to existing shutters of this pattern. The extra price of shutters with the "Durable" in lieu of the pneumatic dischargers listed below, will be quoted on application.

Avoid cheap imitations of apparently the same shutter.

PRICE LIST (with Pneumatic Discharger).

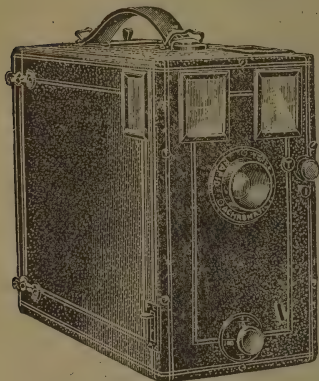
Full size	Full size
Opening.	Opening.
3 in. ... £1 7 6	5½ in. ... £2 0 0
4 " ... 1 10 0	6½ " ... 2 5 0
4½ " ... 1 15 0	8 " ... 2 15 0

Extra Pneumatic Balls, with latch complete, **3/6**. Extra tubing, **5d.** per foot. Extra Valve, **1/-**.

The above prices are subject to 5 per. cent. for Cash with Order.

W. WATSON & SONS, 313, HIGH HOLBORN, LONDON W.C.
And 16, Forrest Road, Edinburgh.

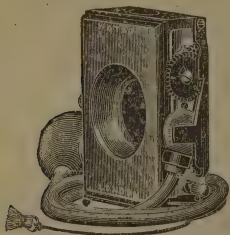
The REPEATER Hand Camera.



For 12 Plates, $4\frac{1}{2} \times 3\frac{1}{2}$.

This Camera is of magazine form, and carries twelve plates in sheaths. The changing of the plates is automatic, the number of the exposure being simultaneously recorded on a disc in the top of the Camera. The box is covered with black leather, and is of unobtrusive appearance. The Camera is fitted with Achromatic Landscape Lens, with Iris Diaphragm, Time and Instantaneous Shutter, and bright or ground-glass View Finders for horizontal or vertical pictures. It can also be attached to a tripod.

Price £1 1 0.



Roller-Blind Shutters for Time and Instantaneous Exposures.

These Shutters are of a well-known pattern, with mahogany boxes, well made, and can be thoroughly recommended. Each Shutter is fitted with a speed indicator. The speeds vary from $\frac{1}{15}$ th of a second to $\frac{1}{60}$ th in the smallest size, and $\frac{1}{70}$ th in the larger sizes.

PRICE LIST.

Before or behind Lens pattern, complete with speed indicator and pneumatic release.

$1\frac{1}{2}$ in.	2 in.	$2\frac{1}{2}$ in.	3 in.	$3\frac{1}{2}$ in.	4 in.
12/6	12/6	15/-	17/6	21/-	25/-

Trigger release, extra, up to $2\frac{1}{2}$ in., 2/6; larger, 3/6.

Bausch and Lomb Diaphragm Shutters.

Best quality, giving exposures from 3 seconds to $\frac{1}{100}$ th.

Size.	Opening.	Brass Mount.	Aluminium Mount.
5×4 ...	$\frac{1}{2}$ in. ...	£2 18 0	£3 15 0
$\frac{1}{2}$ -plate ...	$1\frac{1}{16}$ in. ...	3 2 0	4 0 0
$\frac{1}{4}$...	$1\frac{1}{16}$ „ ...	3 6 0	4 10 0
10×8 ...	$1\frac{1}{4}$ „ ...	3 12 0	5 10 0

A modified form of the above Shutter, the "Unicum," is also supplied. It is fitted with trigger and ball release, and gives timed exposures of from 1 second to $\frac{1}{100}$ th. Any longer exposures can be made.

PRICES.

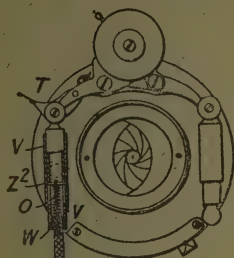
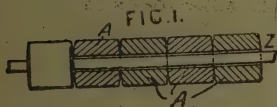
$\frac{1}{2}$ plate and 5×4 , 27/6 ... $\frac{1}{2}$ plate, 37/6 ... $\frac{1}{2}$ plate, 52/6
Fitting to Lenses extra 7/6 to 15/-

THE ABOVE PRICES ARE NET FOR CASH.

W. WATSON & SONS, 313, High Holborn, London, W.C.
And 16, FORREST ROAD, EDINBURGH.

THE LATEST NOVELTY.

WATSON'S PATENT 'DURABLE' SHUTTER RELEASE.



THE "DURABLE" is designed to overcome the failings of the ordinary pneumatic releases, which, it is well known, when used but occasionally, and especially in hot climates, are generally found to be useless just when required, through leaking air or, more frequently, on account of the India-rubber having perished.

The "Durable," being of the simplest construction and made entirely of metal is very flexible, entirely unaffected by intermittent use or by climatic influences. It cannot get out of order, and will last a lifetime.

The illustration shows it fitted to a Bausch & Lomb Shutter.

The release is attached to Roller Blind Shutters, in exactly the same way as the ordinary ball and tube, and can be done by anyone in a few moments.

From the illustration it will be seen that the Discharger is composed of a number of brass beads, A, Fig. 1, through which runs a steel wire, the end of the beads being connected to the knob X' and the wire to the knob V. The act of bringing these knobs together draws the wire through the beads and raises the lever, which discharges the Shutter.

The "Durable" can be fitted to any existing Shutters of the following types:—

ROLLER BLIND (Thornton-Pickard, &c.).

BAUSCH & LOMB SHUTTER.

WATSON'S STUDIO SHUTTER

(as page 1227).

Price (for Roller Blind Shutters), 2s. 6d.,

ADVANTAGES:

No India-rubber to Perish.

No Valves to Leak.

Unaffected by any Climate.

Nothing to get out of order.

Last a Lifetime.

W. WATSON & SONS 313, HIGH HOLBORN, LONDON, W.C.

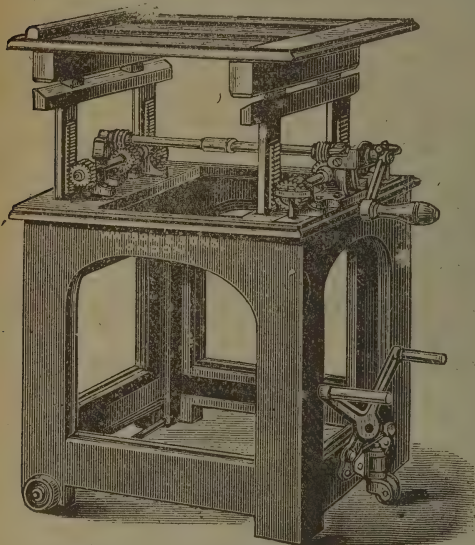
And 16, FORREST ROAD, EDINBURGH.

Studio Camera Stands.

WE make a special feature of Studio Stands, of which we hold the largest and best assortment in London. These Stands are elegant in design, of great stability, and are made throughout of well-seasoned materials. The gearing for raising and lowering is thoroughly reliable and well-finished.

Watson's "Premier" Studio Stand For Large Cameras.

THE top is supported on four pillars and raised by four racks working with one handle



and, the weight being thus distributed, the up and down movement is exceedingly easy; also, by a simple device, one pair of racks, either the front or back, may be thrown out of gear, and the other be moved alone, and a tilting motion so obtained; this is most convenient to use, and holds the top, inclined at any angle, perfectly rigidly. The stand is mounted on wheels to move about, but, by pushing with the foot the lever at the back to one side, the back wheel is thrown out of gear, and the stand remains solid on the ground; by reversing the lever, the wheels are at once available to move the stand. There are also adjusting screws, to adapt the legs to stand firm on uneven floors when required. A thoroughly practical Stand. Strongly recommended. Made in mahogany; size of top, 24 in. x 20 in.

Price £8 10s.

231.

PREMIER STAND as above, but extra large and massive; size of top 36 in. x 24 in. made to order only, **£12 10s.**

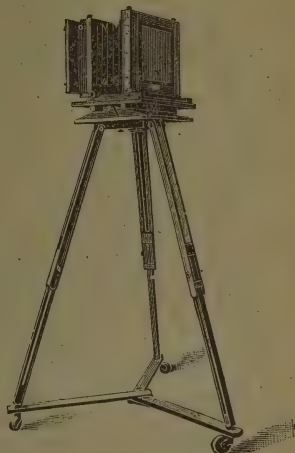
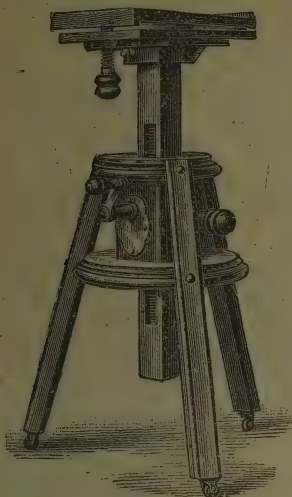
The lip at the top of these Stands, against which the Camera butts, is made removable, leaving the top flush, that in the event of carrying a very large Camera, for copying, &c., it may overhang, if desired, at front and back.

NOTE. The above Prices are subject to 5 per cent. Discount for Cash with Order.

W. WATSON & SONS, 313, HIGH HOLBORN, LONDON, W.C.

And 16, FORREST ROAD, EDINBURGH.

STUDIO CAMERA STANDS.



ELLIS MODEL.

- 232** Studio Table Stand, as illustrated, polished pine, with rack for raising or lowering, and screw for tilting, a thoroughly first-class stand for Cameras up to $8\frac{1}{2}$ by $6\frac{1}{2}$ or 10 by 8, size of top 16 by 11 in. £3 10 0
- 233** Ditto, ditto, in polished oak .. / .. 5 0 0
- 234** Handsome Studio Table Stand, larger and more solid than the above, with curved legs, improved pattern rackwork, and tilting arrangement. Size of top 20 in. by 15 in., suitable for 12 by 10 Cameras. Made in seasoned pine and polished in natural colour or stained walnut .. 5 15 0

THE ELLIS STAND. This apparatus consists of a complete tripod of usual shape with triangular top, in which form it is available as an ordinary field tripod. In addition, a studio table top is supplied, with tilting and lowering movement by means of an endless screw, and a three-fold base for strutting the legs firmly apart. The advantages of a **folding Studio Stand** can be seen at a glance, and will be appreciated by the photographer who has experienced the inconvenience of being called upon to take portraits, etc., away from his studio. The legs having sliding adjustment, the camera can be worked either very low down or at its fullest extent. The centre of the triangular top is turned out so that a camera can be placed upon it with the lens projecting through. This will be found very convenient for photographing jewellery and other objects requiring even illumination. The height of the stand is 4 ft. 6 in., and when shut down 2 ft. 6 in. The total weight, with studio top, is 13 lbs.

The stand is made in mahogany, polished, and is of best workmanship and materials throughout. Price £5.

The above prices are subject to 5 per cent. Discount for Cash with Order.

W. WATSON & SONS, 313, High Holborn, London, W.C.
And 16, FORREST ROAD, EDINBURGH.

Watson & Sons' Tripods.

3-Fold Stand , as supplied with our Acme Cameras, very rigid, and with mahogany top, cloth covered, 4 in. and 6 in.	£1 5 0
Ditto, ditto, 8 in., £1 10s.; 10 in.	1 15 0
Special 3-Fold Stand , strong and well made, for $\frac{1}{2}$ -plate or smaller cameras	0 10 6
Strong 2-Fold Stand , with top complete	0 5 0
Best Sliding Leg Stand , suitable for heavy cameras up to 15 x 12, made of ash, with 10 in. mahogany top	2 2 0
Ditto, ditto, heavier, and with 12 in. top	2 10 0
Very Strong Ash Stand , solid legs, with large triangle top, suitable for cameras up to 24 x 20	3 3 0
Cyclist Stand , 4-fold, length when closed 16 in., and weight under 2 lbs., very rigid, and suitable for cameras up to $\frac{1}{2}$ -plate	0 17 6
Ditto, ditto, with sliding adjustment to legs	1 1 0
Aluminium Telescopic Tripod for $\frac{1}{4}$ -plate and 5 x 4 hand cameras, weight 14 ozs., height 4 ft., when closed 14 ins.	1 10 0
Di to, ditto, height 5 ft., when closed 16 $\frac{1}{2}$ ins.	1 13 0
Quickset Tripod , new pattern, a combination of aluminium and wood, possessing great rigidity, strength, and lightness. Weight, 1 $\frac{1}{2}$ lbs.	1 1 0

CASES FOR TRIPODS.

	Mail Canvas, of good quality, leather bound.			Mail Canvas, best quality.			Solid Leather.		
	s.	d.		s.	d.		s.	d.	
3-Fold Pattern, except largest size	4	6	.....	7	6	.....	12	6	
3-Fold Pattern, largest size	6	6	.....	10	6	.....	15	0	
Best Sliding-leg Pattern	7	6	.....	12	6	.....	20	0	
4-Fold Cyclist Pattern	3	6	.....	5	0	.....	6	6	
Aluminium Stand							5	0	
„ „ large size							6	0	

Note. The above prices are subject to 5 per cent. discount for cash with order

W. WATSON & SONS, 313, HIGH HOLBORN, LONDON, W.C.

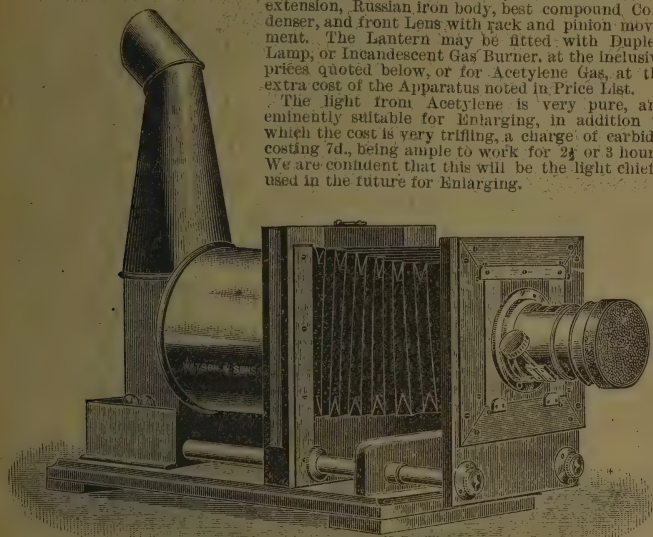
And 16, Forrest Road, Edinburgh.

ENLARGING LANTERNS.

THE ACME,

As illustrated, of finest quality throughout, with Mahogany front and baseboard, with leather bellows extension, Russian iron body, best compound Condenser, and front Lens with rack and pinion movement. The Lantern may be fitted with Duplex Lamp, or Incandescent Gas Burner, at the inclusive prices quoted below, or for Acetylene Gas, at the extra cost of the Apparatus noted in Price List.

The light from Acetylene is very pure, and eminently suitable for Enlarging, in addition to which the cost is very trifling, a charge of carbide, costing 7d., being ample to work for 2½ or 3 hours. We are confident that this will be the light chiefly used in the future for Enlarging.



So that this apparatus may meet the requirements of those who wish to use the same Lens in enlarging as in the taking of the negative, and as this Lens is not generally provided with a rack and pinion, we fit to the Lantern, at the extra cost noted, a screw movement by which the focus can be most exactly adjusted. This is a very great convenience, and marks a new advance in this type of apparatus.

	1-plate, 5½ in. Condenser.	5 × 4, 6½ in. Condenser.	1-plate, 8½ in. Condenser.
With Front Lens	£7 15 0	£9 10 0	£12 10 0
Without	8 0 0	7 10 0	10 0 0
Extra for fitting Screw Adjustment	0 7 6	0 7 6	0 10 0
Generator for Acetylene Gas	1 5 0	1 5 0	1 5 0

Enlarging Base, on pillar, with adjustable board, 33 × 23 in., to hold bromide paper.

Strongly made in pine, and polished. £1 10s.

Calcium Carbide (for Acetylene) per lb., 7d.

THE POPULAR

Enlarging Lantern, though not of such quality as the above, is one we can thoroughly recommend, being well made and thoroughly efficient. It is undoubtedly the cheapest Lantern and fullest value ever offered to purchasers.

	1-plate.	1-plate.
Complete with Front Lens	£5 10 0	£9 0 0
Without	4 15 0	7 10 0

This Lantern may be fitted either for Oil, Incandescent Gas, or Acetylene. Extra cost of the latter as above.

W. WATSON & SONS, 313, High Holborn, London, W.C.
And 16, FORREST ROAD, EDINBURGH.

ENLARGERS

FOR KODAK, FRENA, AND HAND CAMERA NEGATIVES.

(PATENT.)

Make Enlarging as Simple as A B C.

AN INDISPENSABLE PART OF . . .
EVERY PHOTOGRAPHER'S OUTFIT.

ALWAYS READY. NO FOCUSSING REQUIRED.

THESE Enlargers have met with a very gratifying reception, and have given universal satisfaction to their users.

Always Ready.

They are very simple to use, and no focussing or preparation being needed, are always ready. All that is necessary is to push the Kodak into the Enlarger, place the negative and Bromide paper in position, expose, develop, and fix (the whole operations being complete in five minutes), and the result is a picture of an important size, as sharp as the negative can yield, and in many instances superior in every way to small direct prints from the negative.

The same Lens which takes the negative also makes the Enlargement, a condition which is generally recognised as essential for obtaining the finest results.

Enlarged Negatives.

When it is desired to make large prints on P.O.P., Carbon, Velox, Platinotype, &c., an Enlarged Negative can be produced in the apparatus for the purpose. Full Instructions are supplied with each Apparatus, and also practical hints on making Enlargements.

Enlarging at Night.

To make these Enlargers of still greater utility we now supply attachments for burning Magnesium Wire, for use at night, or in very dull weather. This is a thoroughly practical method, and one which we can strongly recommend. Enlargements can be obtained by it fully equal in uniformity and brilliancy to those made in any other way. It is also less expensive than other artificial light, a half ounce coil of Wire, costing 1/-, containing sufficient to make thirty enlargements from average negatives.



In connection with these Enlargers we beg to announce a **COMPETITION**, in which 28 Cash Prizes of from £2 2s. to 10 6 will be given. Apply for particulars and Entry Form to your nearest Photo Dealer, or direct to

W. WATSON & SONS, 313, High Holborn, London, W.C.
And 16, FORREST ROAD, EDINBURGH.

PRICE LIST OF ENLARGERS

Enlargers for use in conjunction with—	Size of Picture.		
	Half Plate. s. d.	Whole Plate. s. d.	Whole Plate and 10×8. s. d.
Little Nipper	6 6	—	—
Brownie Kodak	6 6	—	—
No. 2 Little Nipper Cameras	6 6	*10 0	—
Scout Camera	6 6	*10 0	—
F.O.P. Frena Camera	6 6	*10 0	—
No. 2 Brownie Kodak	—	*12 6	15 0
Pocket Kodak... ..	6 6	—	—
F.P.K. No. 1	—	12 6	15 0
" No. 1a... ..	—	12 6	15 0
" No. 2	—	12 6	15 0
Bull's-Eye Kodak No. 2 †	—	12 6	15 0
" " Special †	—	15 0	17 6
Plico Kodak No. 2 †... ..	—	15 0	17 6
Memo. Frena	—	15 0	17 6

Magnesium Attachment all sizes, 2s. Post, 4d.

Box and post, 6/6 size, 1/-; other sizes 1/6. *Half-plate and Whole-plate.

† The Enlargements from these are square ($8\frac{1}{2} \times 8\frac{1}{2}$ and 10×10).

N.B.—As Frena Cameras vary in size and pattern, it is necessary, when ordering, to send the front part of the Camera carrying the Lens (not the changing mechanism) to insure the fit and focus being accurately adjusted.

ENLARGERS, COMPLETE WITH LENS.

Ready Focussed for Glass or Film Negatives.

1/4 - plate size and under, to 8 1/2 x 6 1/2 and 10 x 8	...	...	...	£1 15 0
5 x 4 Do.	Do.	Do.	Do.	2 0 0

Magnesium attachment, **2/6**; post, 4d.

SPECIAL ENLARGER, COLLAPSIBLE.

OPEN.

CLOSED.

New Pattern.



With bellows extension, enlarging from $\frac{1}{2}$ -plate glass or film negatives to whole plate, 10×8 and 12×10 , complete with Lens.

£3 10 0.

Without Lens,

£3 3 0.

Magnesium attachment, **3/6**; post, 4d.

✎ This Enlarger can also be adapted for $\frac{1}{4}$ -plate and 5×4 negatives by the addition of a Lens of shorter focus, costing **10/6** extra; and negative carriers, **2/-** each.

Extract from a Letter :—

"I received the $\frac{1}{2}$ -plate Enlarger to-day, and have made several Enlargements, which are perfectly satisfactory. If your Enlarger has a fault, it is the absolute simplicity of working it, which makes one feel there is little credit, if much satisfaction, in getting good results."

BROMIDE PAPER (Wellington & Ward's), per packet of 12 sheets—

$6\frac{1}{2} \times 4\frac{1}{2}$	$6\frac{1}{2} \times 6\frac{1}{2}$	$8\frac{1}{2} \times 6\frac{1}{2}$	$8\frac{1}{2} \times 8\frac{1}{2}$	10×8	10×10	12×10
1/-	1/6	2/-	2/8	2/9	3/6	4/2

"UNIOI" DEVELOPER, per 20-oz. bottle, **1/3**. (Strongly recommended.)

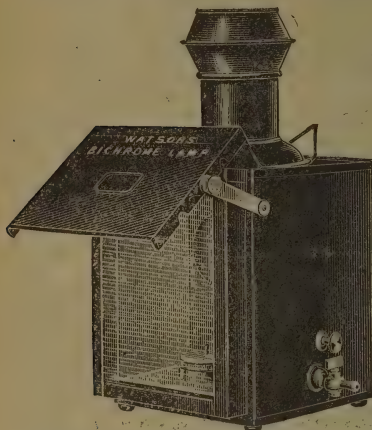
MAGNESIUM RIBBON, 2/- per oz. ; 1/- per ½-oz.

The above Prices are Net for Cash with Order.

W. WATSON & SONS, 313, HIGH HOLBORN, LONDON, W.C.

And 16, Forrest Road, Edinburgh.

Revolution in Dark Room Lighting



**Fifty times as much Light
with equal Safety.**

WATSON'S BICHROME LAMP.

RECENT experiments have clearly shown the vast superiority of liquid filters, for purposes of Dark Room Illumination, over the orange or ruby glass or fabrics usually employed. The latter allow only about 1 per cent. of the total rays to pass, but a properly selected liquid filter passes 50 per cent. with equal safety. It is now possible, therefore, to have a room in which, while the light is safe for development, the operator can see comfortably, and thus runs no risk of knocking over measures or dishes.

The Bichrome Lamp illustrated above is supplied with a good paraffin lamp adjustable from the outside, and the larger size has also a burner and tap for ordinary gas if required. In the front is fitted a bath containing a solution of bichromate with certain carefully selected proportions of aniline dyes. It gives a magnificent light, in which ordinary plates can be safely developed, but we recommend that the lamp be placed on an overhanging shelf, in the shadow of which the dish should be kept during the early stages of development.

The lamp is well ventilated, and the liquid helps to keep it cool, thereby still further adding to the comfort of the room.

The light as supplied is not suitable for Orthochromatic Plates, but a sheet of ruby fabric placed over the front would render it so, the usual precautions being taken against undue exposure to light during development.

Price complete, 10 by 8 ... 30s. Smaller Size, 8 by 5 ... 22s. 6d.

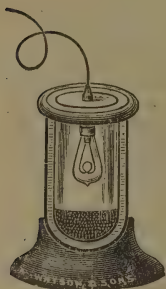
WATSON'S ELECTRIC BICHROME LAMP

Is made in two patterns, one having a flat base to rest on a shelf, the other being made to suspend by a hook from shelf or ceiling. Where the current is available we recommend the adoption of these patterns in preference to Gas or Oil.

Price complete on Stand, and fitted with 16-c.p. Lamp ... 35s.

Another pattern for suspension is supplied with 8-c.p. Lamp 21s.

(100 Volts unless otherwise ordered.)



**W. WATSON & SONS, 313, HIGH HOLBORN, LONDON, W.C.,
And 16, Forrest Road, Edinburgh.**

EXTRA DARK SLIDES FOR CAMERAS.

NOTE.—The Dark Slides quoted below, and all supplied by us, have now the Shutters fitted with our AUTOMATIC SPRING FASTENING at top to keep them closed, and prevent them from opening accidentally, our IMPROVED FLEXIBLE HINGES, the joints of which overlap one another, and perfectly prevent light passing them under any circumstances, and our special pattern STOPS, which dispense with the ordinary screws that are used generally on shutters to stop them when drawn out, and obviate the necessity of any projection inside or outside the dark slide. The advantages are : the Shutter is stronger and less liable to breakage, the chance of scratching the negative by the screw stops is done away with. Inner Frames require no fitting, there being no projection to allow for.

English Inches.	Size ^d .	French c.m.	Single Backs. £ s. d.	Double Backs. £ s. d.	Brass- bound ex. £ s. d.
4½ × 3½	9 × 12 ..	0 12 6 ..	0 15 0 ..	0 3 6
5 × 4	0 15 0 ..	0 17 0 ..	0 3 6
6½ × 4½ and 6½ × 3½	18 × 13 ..	0 17 6 ..	1 1 0 ..	0 3 6
7½ × 5	21 × 15 ..	0 18 6 ..	1 1 0 ..	0 3 6
8½ × 6½	1 0 0 ..	1 3 6 ..	0 4 0
8½ × 8½	1 2 0 ..	1 6 0 ..	0 4 0
9½ × 8½	1 4 6 ..	1 8 0 ..	0 4 0
10 × 8	24 × 18 ..	1 6 0 ..	1 10 6 ..	0 5 0
10 × 10	1 8 0 ..	1 14 0 ..	0 5 6
12 × 10	30 × 24 ..	1 10 6 ..	1 16 6 ..	0 5 6
12 × 12	1 12 6 ..	1 18 0 ..	0 5 6
15 × 12	2 0 0 ..	2 10 0 ..	0 6 0
15 × 15	30 × 40 ..	2 10 0 ..	3 1 0 ..	0 6 6
18 × 16	3 0 0 ..	3 15 0 ..	0 6 6
18 × 18	3 5 0 ..	4 0 0 ..	0 6 6
22 × 20	4 0 0 ..	5 0 0 ..	0 7 0
22 × 22	4 10 0 ..	5 10 0 ..	0 7 0

The above Prices are subject to 5 per cent. Discount for Cash with Order.

CIRCLE PRINT TRIMMER.

An absolutely reliable appliance for cutting Circular Prints, Lantern Masks, &c. The apparatus consists of a handle, to which is screwed a wheel of suitable size for conveniently holding flat the paper to be cut, and carrying an arm on which the adjustable cutter is fixed. Two wheels for different sizes are supplied with each cutter.

PRICES.

To cut up to 4½ in., 4/0 each.

" " 6 " 6/6 "

" " 8 " 8/6 "

" " 10 " 10/6 "

INNER FRAMES.

PRICES.

Outside Sizes.

6½ × 4½ ... 1/9

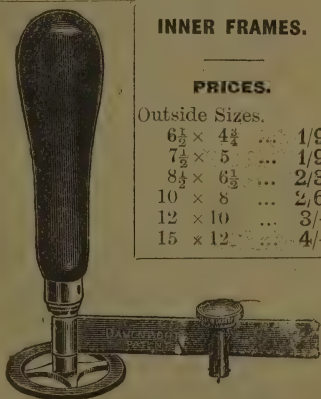
7½ × 5 ... 1/9

8½ × 6½ ... 2/3

10 × 8 ... 2/6

12 × 10 ... 3/-

15 × 12 ... 4/-



W. WATSON & SONS, 313, High Holborn, London, W.C.
And 16, FORREST ROAD, EDINBURGH.

W. WATSON & SONS'

Progressive Payment System.

ANY article in this list of not less than £5 in value may be purchased on the above system, payments being spread over a period of six or twelve months, in equal instalments. Full particulars of the conditions, to be complied with in such cases, will be found in our full Catalogue, or will be forwarded by post on application.

COMMISSION AND AGENCY DEPARTMENT.

W. WATSON & SONS undertake for their correspondents, when desired to so, the purchasing, packing, and forwarding of any kind of goods whatsoever, and every care will be taken in executing such commissions.

There is ordinarily no charge made for these purchases, as a deduction is made to us, as a wholesale firm, from most houses; but, on a few special goods, where no deduction is given, the charge is five per cent. on the amount of invoice.

Packing and shipping expenses are, of course, always at the cost of the client.



OPTICAL AND PHOTOGRAPHIC INSTRUMENTS

OF SPECIAL DESIGN AND FOR ANY

SPECIAL REQUIREMENTS,

MADE PROMPTLY TO ORDER.

Estimates Furnished on Application.

W. WATSON & SONS,

(Opticians to H. M. Government.)

313 High Holborn, London, W.C., 16 Forrest Road, Edinburgh,

And 78 Swanston St., Melbourne, Aus.

Steam Factories:

9, 10, 11, 16, & 17 Fulwood's Rents, Holborn, W.C.

Established 1837.

Lizars' . . . "Challenge" Cameras. .



HAVE attained the most enviable position for perfect workmanship and compactness. They, being in use all over the world, have stood most satisfactorily the tests of every climate.

... THEY POSSESS ...

BRILLIANT IDEAS!

RELIABLE MATERIAL!

PERFECT WORKMANSHIP!

and have, in combination, a compactness and solidity which has been ungrudgingly admired, not only by the Photographic Trade Journals, but also by workers with these instruments.



There are over **70 PATTERNS** of these Cameras manufactured.

The most comprehensive series in the world.

A glance at the following 15 pages will repay you.

Reference Book and Illustrated Catalogue
 (200 pages) free on application.

The Camera of the Season.

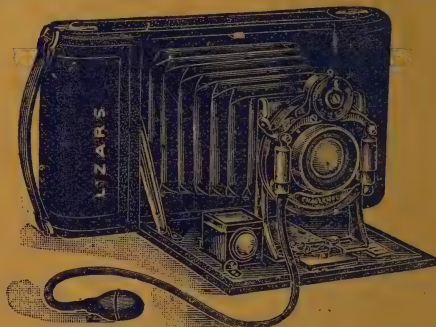
LIZARS' "CHALLENGE" DAYSPPOOL NO. 1.

For Daylight Loading Films.

Quarter-Plate ($3\frac{1}{4} \times 4\frac{1}{4}$.) 12 Exposures.

A MARVEL OF COMPACTNESS & INGENUITY. Size only $7\frac{7}{8} \times 4\frac{3}{8} \times 1\frac{1}{2}$ thick.

Thousands
Sold
First
Season.



Demand
Greater
than
supply.

This shows the Camera open, ready for taking an oblong photograph.

Its Special Features.

BRITISH MADE. BRITISH LABOUR. BRITISH CAPITAL.

Can be used with plates as well as films without any appreciable difference in bulk.

Lenses by every maker can be adapted, provided the focus is not more than 6 inches.

Fitted with the famous Bausch & Lomb "Unicum" shutter.

Supplied with special automatic Locking Device when front reaches infinity.

Made of the finest Spanish mahogany throughout, and absolutely free from any thin sheet metal so liable to get dented, twisted, and out of order. Undoubtedly a Camera that will slip with freedom into any ordinary coat pocket.

Being easily loaded and unloaded it is an ideal ladies' companion.

Anyone possessing a Bausch & Lomb "Unicum" shutter or similar shutter, with a lens not exceeding 6 inches in focus, can have it applied to one of the quarter-plate Cameras at a nominal cost, the lens and shutter being still available for any other Camera.

Wherever it is seen it is appreciated, owing to its charming appearance and simplicity.

For producing work of the highest excellence it cannot be surpassed.

Many other advantages are enumerated in the specification which follows.

SEE PRECEDING AND FOLLOWING PAGES.

SPECIFICATION OF NO. 1 DAYSPPOOL.

Camera. Of the Folding Pocket type made in thoroughly seasoned and finest Spanish mahogany, either polished or covered in best hard Morocco grained leather. Handsome leather bellows. Instantly opened and front pulled out on brass guides, and securely and rigidly fixed at any position with quick acting clamping screw. There is also an infinity catch, which automatically locks the front when at that distance without the necessity of clamping. Ten out of twelve exposures are made on the oblong way of the film or plate, consequently it is more serviceable when it opens in that form. A carefully graduated scale for various distances is fixed to the baseboard. Rising and cross front for horizontal and vertical pictures. No projection beyond the flush of the camera, therefore nothing to catch on the sides of the pocket. Can be used on a stand.

Shutter. Unlike most cameras of this class, the shutter supplied is the famous Bausch and Lomb "Unicum," with time and instantaneous movements from one to tenth part of a second, and released either by ball and tube or finger trigger, both of which are supplied. Being constructed of metal throughout, extreme climatic changes do not affect it.

Lenses. All lenses are carefully selected and tested before fixing to the cameras, and each fitted with Iris diaphragm.

Finder. The new brilliant form, giving exactly the same view as that shown by the lens and reversible for horizontal or vertical pictures.

Finish. Great exactness and most beautiful work throughout.

PRICE, as per Specification.

Fitted with	$\frac{1}{2}$ plate.	5×4
With "Challenge" R.R. Lens	£3 12 6	£5 2 6
With Busch Detective Aplanat Lens, F/6	4 10 6	6 0 0
With Taylor, Taylor and Hobson Lens	4 12 6	6 2 6
With Ross Symmetric Anastigmat Lens	...	7 7 6
With Taylor & Hobson "Cooke" Lens, F/6.5	7 2 6	8 12 6
With Goerz Double Anastigmat Lens, Series III., F/6.8	8 2 6	9 17 6
With Dallmeyer Stigmatic Lens, F/6	8 12 6	9 12 6
Lenses by other makers, prices on application.		
Plate Adapter, Focussing Screen with Hood, and one Double Dark Slide with Double Light Traps, and Aluminium Draw-out Shutters	0 11 6	0 13 6
Extra Double Dark Slides, each	0 5 0	0 6 6
Solid Leather Case to hold Camera	0 6 6	0 8 6
Camera only, and fitting customer's own shutter and lens (not exceeding 6 inch focus), for $\frac{1}{2}$ plate and $6\frac{1}{2}$ inch for 5×4, supplying and fitting View Finder and Scaling	2 10 0	3 12 6
7 × 5 size now being manufactured.		

Note. The Dallmeyer Lens supplied with the $\frac{1}{2}$ -plate and 5×4 cameras is the No. 2 of 5.3 in. focus.

The Beck Double Aplanat and Aldis Lenses will be added in a few weeks.

Daylight Loading Spools, $\frac{1}{2}$ -plate, 6 exposures, 1/6; 12 exposures 3/-. 5×4, 6 exposures, 1/11; 12 exposures, 3/9.

Dimensions of $\frac{1}{2}$ -plate Camera when closed, $7\frac{7}{8} \times 4\frac{3}{4} \times 1\frac{1}{2}$. Weight of Camera, including Lens, shutter, and Finder, 26 ounces.

Dimensions of 5×4 Camera when closed, $9\frac{1}{4} \times 5\frac{1}{16} \times 2$. Weight of Camera, including Lens, shutter, and Finder, 32 ounces.

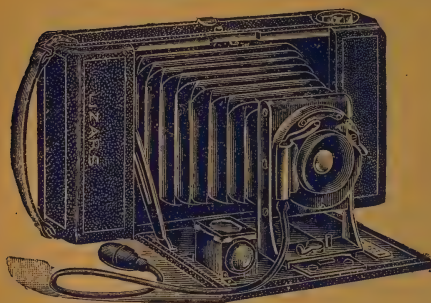
If fitted with Bausch & Lomb's Improved New Automatic Unicum Shutter, 5/- extra.

Smaller sizes of the "Challenge" Dayspool will shortly be on the Market.

SEE PRECEDING AND FOLLOWING PAGES.

LIZARS' 'CHALLENGE' DAYSPPOOL No. 2.

FOR DAYLIGHT LOADING FILMS ONLY.



Quarter Plate ($3\frac{1}{4} \times 4\frac{1}{4}$).

12 Exposures.

The specification for this Camera is identical in every respect to the "Challenge" No. 1 Dayspool, previously described, with the exception that it has no rising and falling front, and is adapted for daylight loading films only. The shutter is Bausch & Lomb's "Gem" Automatic, fitted with Iris diaphragm, and superior quality achromatic view lens, giving fine definition and covering power.

Price ($\frac{1}{4}$ -Plate only), £2. 2s.

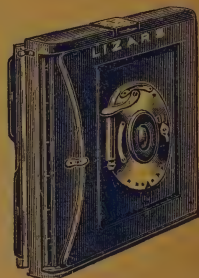
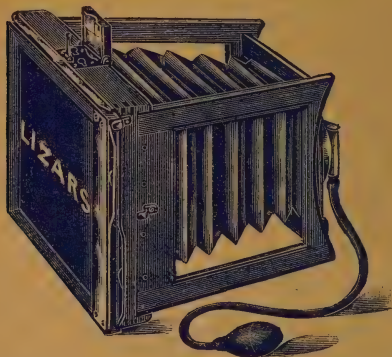
Solid leather case to hold Camera, 6/6.
Weight of Camera, including lens, shutter and finder, 23 ounces.

LIZARS' "CHALLENGE" HAND CAMERA. MODEL H.

ABSOLUTELY A POCKET CAMERA.

The Smallest $\frac{1}{4}$ -Plate Camera on Record.

Thoroughly Efficient and Reliable.



Camera is made of the best Spanish mahogany, with leather bellows.

Shutter.—Bausch & Lomb's "Automatic" Metal Shutter, and works for either time or instantaneous exposures.

Finder is a concave one with cross lines, set into the body of the Camera. When closed it is almost flush with the frame.

Lenses.—The Lenses supplied with these Cameras are of excellent quality, and give fine definition.

Slides.—Three in number, double, and of the solid form, with aluminium draw-out shutters, but on a new and improved principle. The **Double Light Traps**, which are fitted to the Slides, are an entirely new device, making them equal to the best Book Form pattern.

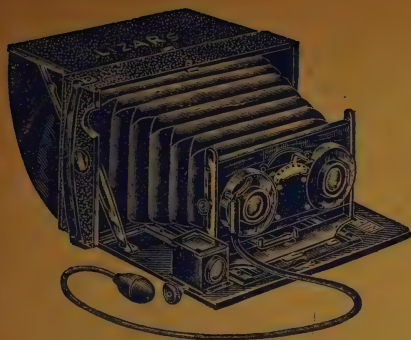
Special Features.—Compactness—Camera and Slides being easily accommodated in an ordinary coat pocket. Instantly opened, and immediately set at infinity. Bushes are let into the body of the Camera so that it may be used with a Stand.

Price, as Specification.

	£	s.	d.
$\frac{1}{4}$ -plate, with high-class Achromatic View Lens,	2	2	0
With Bausch & Lomb's "Unicum" Shutter and superior quality of R.R. Lens,	3	10	0
Solid Leather Case, to take Camera and Three Slides,		7	6
Extra Double Dark Slides, each		6	6

Dimensions of Camera when closed $5\frac{1}{8} \times 4\frac{1}{4} \times \frac{7}{8}$ in. thick. Weight of Camera and Three Slides, including Lens, Shutter, and Finder, is 11 oz.

SEE PRECEDING AND FOLLOWING PAGES.



Lizars' "Challenge" Model B STEREOSCOPIC CAMERA.

For Plates $6\frac{1}{2} \times 3\frac{1}{4}$.
Dimensions when Closed,
 $8\frac{1}{4} \times 4\frac{1}{2} \times 2$.

Novel Features.

From the above measurements one can readily see that this is practically a Pocket Stereo. Camera. The Camera has been constructed in two forms—namely, with fixed division in bellows, and with loose division. With the fixed division, pictures either Stereoscopic or Lantern Plate size ($3\frac{1}{2}$ inch square), two on one plate, may be produced, the latter being obtained by capping the one lens and making the exposure with the other. The instrument with the loose division will produce either Stereoscopic Pictures or, by the removal of the division, the **Artistic Landscape or Panel Shape**, $6\frac{1}{2} \times 3\frac{1}{4}$. For the Landscape size it is necessary to have an extra front panel and a half-plate lens, which take the place of the stereo. shutter and lenses

SPECIFICATION.

Camera. Made in finest Spanish Mahogany, either polished or covered in best quality hard grained leather. Focussing hood, as shown in illustration, and leather bellows.

Shutter. The famous Bausch & Lomb, which works either time or instantaneous. The two shutters are ever set, and are operated simultaneously by one pneumatic or trigger release.

Slides. Three in number, double, and of the solid form, aluminium draw out shutters, but on a new and improved principle. **The double light traps** which are fitted to the slides is an entirely new device, making them equal to the best book form pattern.

Lenses. A pair of fine quality rapid rectilinear lenses, with Iris diaphragms, controlled by one lever. These are carefully selected and tested.

Finder. The new brilliant series, and set as near as possible to show the same view as that given by the lenses.

Finish. This is carried out with great exactness, and the pictures are focussed from 6 feet to infinity on a carefully graduated scale.

Special Points. Rising front and swing back. Focussed by rack and pinion. Admirably adapted as a Stand Camera, for which purposes bushes are provided. Instantly opened, and immediately set at infinity by the new and improved pull-out front, with quick clamping action.

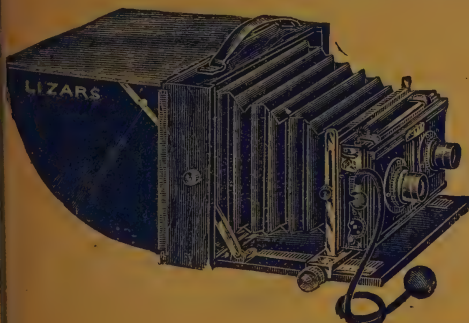
PRICE, as per Specification, £5 5s. only.

With loose division in bellows and loose front panel, £5 10s. Extra front panels, 2s. each.

Extra Double Dark Slides, 8s. each.

Solid Leather Case, with lock, hand, shoulder, and cycle straps, to hold Camera and three Slides, 18s.

Waterproof Mailcloth Canvas Case, with hand and shoulder straps, 7s. 6d.



Lizars' "Challenge" STEREOSCOPIC OR HALF-PLATE CAMERA

The "Challenge" Stereoscopic or Half-Plate Camera has been designed to fulfil certain essential requirements, i.e., an instrument capable of doing the highest quality of work, combining every necessary movement, portable and serviceable, and capable of doing Stereoscopic Photographs or others of half-plate size, the latter being produced by removing in a very simple way the Stereo division in the bellows.

Specification same as Model A Camera

Described on page 1247.

PRICE, as per Specification.

Fitted With "Challenge" R.R. Lenses	£10 10 0	For Camera and Shutter only	£6 10 0
Taylor & Hobson Lenses	12 15 0	For Camera, Shutter, and 3 Slides	8 5 0
Goetz Lenses	13 10 0	For Extra Single Slides	0 12 0

LIZARS' "CHALLENGE" HAND CAMERA.

MODEL C.

For CYCLISTS, TOURISTS, and LADIES.



SPECIFICATION.

Camera.—Made in finest Spanish mahogany, either polished or covered in Morocco leather, leather bellows, and focussing hood.

Shutter.—Is the famous Bausch and Lomb; works time or instantaneous up to rooth-part of a second; being all metal, extreme climatic changes have no effect upon it; recognised by experts as the finest existing.

Finder.—Latest improvement of the new brilliant form, giving exactly the same view as that shown by the lens, and reversible for either horizontal or vertical pictures.

Slides.—Three double book form, on the latest principle; tongued in well; rabbeted frames and shutters; and with automatic closing springs and automatic stop springs to shutters.

Special Features.—Camera, lens, finder, and focussing hood all fold up together, and easily slip into the pocket; no outside projections; rising and cross front for horizontal and vertical pictures; swing back; opens instantly; focussed by rack and pinion; scaled for various distances; as a stand Camera it is perfect.

Finish.—Most beautiful work throughout, with great exactness.

Lenses.—All the lenses supplied with these Cameras are carefully selected and tested before being sent out, each being fitted with Iris diaphragm.

PRICE, as per Specification.

FITTED WITH	$4\frac{1}{2} \times 3\frac{1}{4}$ $\frac{1}{2}$ -Plate.	5×4	$6\frac{1}{2} \times 4\frac{1}{2}$ $\frac{1}{2}$ -Plate.
"Challenge" R.R. Lens	£ s. d. 5 0 0	£ s. d. 6 10 0	£ s. d. 7 13 0
Busch Detective Aplanat Lens, Series A	5 18 0	7 8 0	...
Taylor, Taylor & Hobson Lens	6 0 0	7 10 0	9 0 0
Ross Symmetric Anastigmat Lens ... ..	...	8 15 0	10 15 0
Taylor and Hobson "Cooke" Lens, F/6.5	8 10 0	10 0 0	12 5 0
Goerz Double Anastigmat Lens, Series III, F/6.8	9 10 0	11 5 0	13 10 0
Dallmeyer Stigmatic Lens, F/6	10 0 0	11 0 0	13 0 0

NOTE. The Dallmeyer Lens included in above price is No. 2 for $\frac{1}{2}$ -Plate, No. 2 for 5×4, and No. 3 for $\frac{1}{2}$ -Plate.

Camera and Shutter only	3 0 0	4 0 0	5 5 0
Camera, Shutter, and Three Double Book Slides	4 10 0	5 13 0	7 0 0
Extra Double Book Slides, each	0 11 0	0 12 0	0 12 6
Daylight Cartridge Film Holder, including fitting to Camera, and interchangeable with Dark Slides... ..	1 3 0	1 3 0	1 11 0
Brass Binding Camera and Three Slides	1 2 0	1 5 0	1 10 0
Wide Angle Lens in Cells, and interchangeable with the Lens fitted to the Bausch & Lomb Shutter in leather case	1 2 6	1 2 6	1 5 0
Isochromatic Screen in form of Cap, with leather case ...	0 4 0	0 4 0	0 3 0

SEE PRECEDING AND FOLLOWING PAGES.

Carrying Cases for Model C Cameras.

	$\frac{1}{2}$ -Plate.	5×4	$\frac{1}{2}$ -Plate.
	£ s. d.	£ s. d.	£ s. d.
Solid Leather Case, with Lock, Hand, Shoulder, and Cycle Straps, to hold Camera and Three Slides....	0 10 6	0 13 0	0 16 0
Do. do. to hold Camera and Six Slides	0 13 0	0 16 6	0 18 0

Dimensions, Weight, and Extension of Model C Cameras.

Outside Dimensions of Camera when closed, including Focussing Hood.	$5\frac{1}{2} \times 4\frac{1}{2} \times 2\frac{1}{4}$	$6\frac{3}{8} \times 5\frac{1}{4} \times 2\frac{1}{4}$	$8\frac{1}{4} \times 6\frac{1}{2} \times 2\frac{1}{4}$
*Weight of Camera, including Lens, Shutter, and Finder	24 ounces.	31 ounces.	41 ounces.

* This may vary either way slightly according to lens.

Focal Capacity or Length of Bellows.	7 inches.	8 inches.	9 inches.
---	-----------	-----------	-----------

Continental Sizes.

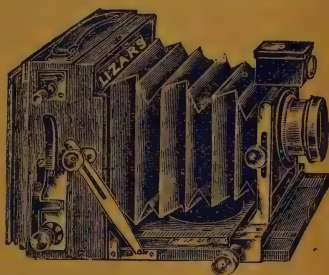
9×12 Centimetres at 10/- more than $\frac{1}{2}$ -plate prices; 13×18 Centimetres at 10/- more than $\frac{1}{2}$ -plate prices

LIZARS' "CHALLENGE" FOCAL PLANE CAMERA.

The Focal Plane Camera has been introduced to meet the growing demand of those who wish to obtain photographs at a very high rate of speed. While designing this instrument everything in the way of compactness, lightness, and workmanship, of the highest order have been taken into consideration. The Camera when folded goes into little more bulk than the thickness of the shutter, and can therefore be carried in the pocket.

Specification as regards Camera, Slides, Lenses and Finder is in every detail identical to model A. described on page 1247.

Shutter.—This forms practically the body of the Camera, and is the well-known Thornton-Pickard, with speed indicator, and works from a 20th part of a second to 1000th part of a second a thumb release for instantaneous work is attached.

**PRICE, as per Specification.**

Quarter-Plate size, with "Challenge" R.R. Lens	£5 15 0
Quarter-Plate size, with Taylor, Taylor & Hobson Lens	6 15 0
Quarter-Plate size, with Ross Rapid Hand Camera Lens	7 15 0
Quarter-Plate size, with Goerz Lens	10 0 0
5×4 size, with "Challenge" R.R. Lens	7 0 0
5×4 size, with Taylor, Taylor & Hobson Lens	8 5 0
5×4 size, with Ross Rapid Hand Camera Lens	9 5 0
5×4 size, with Goerz Lens	11 10 0
Half-Plate size, with Taylor, Taylor & Hobson Lens	9 15 0
Half-Plate size, with Goerz Lens	12 10 0

Note. These Cameras can be fitted with lenses by almost every maker. Prices on application.

For Camera and Shutter only, $\frac{1}{2}$ -plate, £3 15s.; 5×4, £4 15s.; $\frac{1}{2}$ -plate, £6

For Camera, Shutter and 3 Slides, $\frac{1}{2}$ -plate, £5 5s.; 5×4, £6 8s.; $\frac{1}{2}$ -plate, £7 15s.

For Extra Double Book Slides, each, $\frac{1}{2}$ -plate, 11/-; 5×4, 12/-; $\frac{1}{2}$ -plate, 12/6.

CASES FOR FOCAL PLANE CAMERAS.

Solid Leather Case, with Lock, Shoulder and Hand Straps, to hold Camera and 3 Slides, $\frac{1}{2}$ -plate, 10/6; 5×4, 13/-; $\frac{1}{2}$ -plate, 16/-.

To hold Camera and 6 Slides, $\frac{1}{2}$ -plate, 13/-; 5×4, 16/6; $\frac{1}{2}$ -plate, 18/-.

SEE PRECEDING AND FOLLOWING PAGES.

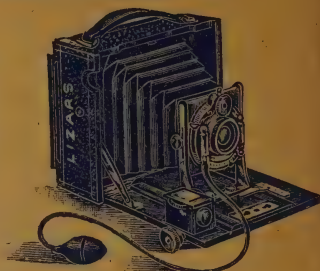
LIZARS' "CHALLENGE" HAND CAMERA.

MODEL E.

This model combines in the one apparatus a Camera of great portability and general usefulness. It is not so small as the model "C," but as it is fitted with a reversing back, and a long double extension baseboard, will probably find favour with those desiring a Camera having a greater range of movements, and who do not object to a little additional bulk.

SPECIFICATION.

The same in every detail to model "C," described on page 1244, excepting that this Camera is fitted with reversing and swing back available on both vertical and horizontal pictures.



PRICE, as per Specification.

Fitted with	Size 1-plate 4½ × 3½	5 × 4	1-plate 6½ × 4½
	£ s. d.	£ s. d.	£ s. d.
"Challenge" R.R. Lens	6 0 0	7 10 0	9 5 0
Busch Detective Aplanat Lens, Series A	6 18 0	8 8 0	
Taylor, Taylor & Hobson Lens	7 0 0	8 10 0	10 10 0
Ross Symmetric Anastigmat Lens		8 15 0	12 5 0
Taylor and Hobson "Cooke", Lens F/6.5	9 10 0	11 0 0	13 15 0
Goerz Double Anastigmatic Lens, Series III., F/6.8	10 10 0	12 5 0	15 0 0
Dallmeyer Stigmatic Lens, F/6	11 0 0	12 0 0	14 10 0

NOTE. The Dallmeyer Lens included in above price is No. 2 for 1-plate, No. 2 for 5 × 4, and No. 3 for 1-plate.

Camera and Shutter only	4 0 0	5 0 0	6 15 0
Camera, Shutter and three double book Slides	5 10 0	6 13 0	8 10 0
Extra Double Book Slides, each	0 11 0	0 12 0	0 12 6
Daylight Cartridge Film Holder including fitting to Camera, and interchangeable with Dark Slides	1 3 0	1 3 0	1 11 0
Brass Binding Camera and Three Slides	1 2 0	1 5 0	1 10 0
Wide Angle Lens in Cells and interchangeable with the Lens fitted to the Bausch & Lomb Shutter, in leather case	1 2 6	1 2 6	1 5 0
Isochromatic Screen in form of Cap, with leather case	0 4 0	0 4 0	0 5 0

Carrying Cases for Model E Cameras.

Solid Leather Case, with Lock, Hand, Shoulder and Cycle Straps, to hold Camera and three Slides	0 12 0	0 15 0	1 0 0
Do. do to hold Camera and six slides	0 15 0	0 18 6	1 4 0

Dimensions, Weight and Extension of Model E Cameras.

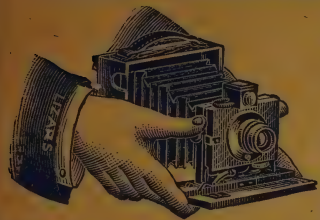
Outside dimensions of Camera when closed including Focussing Hood	5½ × 5½ × 3	6½ × 6½ × 3	8 × 8 × 3½
Weight of Camera, including Lens, Shutter, & Finder	2 lbs. 3 ozs.	2 lbs. 9 oz.	3 lbs. 9 ozs.
Focal Capacity, or length of Bellows	11 inches	13 inches	16½ inches

Continental Sizes.

9 × 12 centimetres at 10/- more than the 1-plate prices. 13 × 18 centimetres at 10/- more than the 1-plate prices.

SEE PRECEDING AND FOLLOWING PAGES.

LIZARS' "CHALLENGE" HAND CAMERA. MODEL A.



Specification as regards Camera, Slide, Lenses and Finder is in every detail identical to Model C, described on page 1244.

Shutter. This forms the front of the Camera, and is the well-known Roller Blind Pattern, which works either time or instantaneous, with speed indicator of the latest form

Special Features. Camera, Lens and Focussing Hood all fold up together, and can be carried in the pocket. Rising front and swing back. Adapted for horizontal and vertical pictures. Scaled for various distances. Instantly opened and ready for action.

Focussed by rack and pinion. As a stand Camera it is perfect. Workmanship and finish of the highest order, and absolutely satisfactory.

PRICE, as per Specification, with one Double Book Slide,

Fitted with	$\frac{1}{4}$ -plate Size $4\frac{1}{2} \times 3\frac{1}{4}$	5×4	$\frac{1}{4}$ -plate Size $6\frac{1}{2} \times 4\frac{1}{4}$
	£ s. d.	£ s. d.	£ s. d.
"Challenge" R.R. Lens	2 15 0	3 15 0	...
Taylor, Taylor & Hobson Lens...	3 15 0	5 0 0	6 10 0
Ross Rapid Hand Camera Lens...	4 15 0	6 0 0	...
Taylor & Hobson "Cooke" Lens, F/6.5	6 5 0	7 10 0	...
Goerz Lens	7 0 0	8 5 0	9 5 0
Dallmeyer Stigmatic Lens, F/6...	7 15 0	8 10 0	10 10 0

NOTE. These Cameras can be fitted with Lenses by almost every maker. Prices on application.

Extras.	$\frac{1}{4}$ -plate Size $4\frac{1}{2} \times 3\frac{1}{4}$	5×4	$\frac{1}{4}$ -plate Size $6\frac{1}{2} \times 4\frac{1}{4}$
	£ s. d.	£ s. d.	£ s. d.
Camera and Shutter only	2 0 0	3 0 0	4 0 0
Camera, Shutter, and Double Book Slide	2 8 6	3 9 6	4 10 0
Extra Double Book Slides, each...	0 8 6	0 9 6	0 10 0
Daylight Cartridge Film Holder, including fitting to Camera, and interchangeable with Dark Slides	1 3 0	1 3 0	1 11 0
Brass Binding Camera and Three Slides	1 2 0	1 5 0	1 10 0

Carrying Cases for Model A Cameras.

Solid Leather Case, with Lock, Hand, and Shoulder Straps, to hold Camera and Three Slides	0 10 6	0 13 0	0 16 0
Do do to hold Camera & Six Slides	0 13 0	0 16 6	0 18 0

Dimensions, Weight, and Extension of Model A Cameras.

Outside Dimensions of Camera when closed, including Focussing Hood	$5\frac{1}{2} \times 4\frac{1}{2} \times 2\frac{1}{2}$	$6\frac{1}{2} \times 5\frac{1}{2} \times 2\frac{1}{2}$	$8\frac{1}{2} \times 6\frac{1}{2} \times 2\frac{3}{8}$
*Weight of Camera, including Lens, Shutter & Finder	32 ozs.	36 ozs.	42 ozs.

*This may vary either way slightly, according to Lens.

Focal Capacity or Length of Bellows	6 $\frac{1}{4}$ inches	7 inches	8 $\frac{1}{4}$ inches
-------------------------------------	------------------------	----------	------------------------

Continental Sizes.

× 12 centimetres, 10/- more than $\frac{1}{4}$ -plate prices. 13 × 18 centimetres, 10/- more than $\frac{1}{2}$ -plate prices.

SEE PRECEDING AND FOLLOWING PAGES.



LIZARS' "CHALLENGE" FOCUSSING MAGAZINE CAMERA.

The "Challenge" Focussing Magazine Camera carries 12 plates or 24 films, with a new and improved changing arrangement and automatic plate register.

The Camera is fitted with two latest form brilliant view finders, one for horizontal pictures and the other for vertical pictures.

The Shutter is Bausch & Lomb's, working up to 100th part of a second. It is set from the outside and also released from the outside with finger trigger or pneumatic ball. Time exposures of any duration can be given. When the Camera is not in use a metal shield protects the opening and prevents dust or injury getting to the lens.

Focussing is adjusted by rack and pinion, and the various distances at which the lens is in focus are engraved on a disc on the outside.

The Sheaths may be inserted in any order, and the Camera is fitted with bushes so that it may be used on a stand in either position.

PRICE, with 12-Plate Sheaths, covered in Best Hard-Grained Leather.

1/2 Plate size, with "Challenge" R.R. Lens	25 0 0
Bush Detective Aplanat Lens, Series A	5 18 0
Taylor, Taylor & Hobson Lens	6 0 0
Taylor & Hobson 6 in. "Cooke" Lens, F/6.5	9 0 0
Goerz Double Anastigmat Lens, Series III., F/6.8	9 10 0
Dallmeyer No. 2 Stigmat Lens, F/6	10 0 0
Extra Plate Sheaths—1/2 Plate, 4/6 per dozen.	
Film Sheaths—1/2 Plate, 5/.	

Also made in 5 × 4 and 1/2-Plate sizes.

63s.

63s.

LIZARS' "CHALLENGE" MAGAZINE CAMERA.

With infallible changing arrangement and automatic indicator. It carries 12 plates or 24 films. It is fitted with the latest form of brilliant view finders, one for taking horizontal photographs and the other for vertical. The shutter is Bausch & Lomb's Unicum double piston pattern, giving time exposures and various speeds from the 5-th part of a second to the 100-th part. The shutter is set from the outside of the Camera and may be released either with finger trigger or pneumatic ball, both of which are supplied. When the instrument is not in use a metal shield slips up and covers the lens so as to prevent it from dust or injury.

The lens is a rapid rectilinear one of an exceedingly high quality, working at F/8, and the aperture is reduced and enlarged at will by the most improved form of iris diaphragm.

The Camera is substantially and reliably made of finest Spanish Mahogany, and finished in the best quality hard-grained leather. The sheaths or plate carriers may be inserted in any order, and the Camera is fitted with bushes so that it may be screwed on a stand in either the horizontal or vertical position.

PRICE, with 12 Plate Sheaths.

With "Challenge" R.R. Lens	23 3 0
With Bush Detective Aplanat Lens, Series A	4 2 0
With Taylor, Taylor & Hobson Lens	4 4 0
With Taylor & Hobson "Cooke" Lens, F/6.5	6 15 0
With Goerz Double Anastigmat Lens, Series III., F/6.8	7 15 0
With Dallmeyer Stigmat Lens, F.6	8 5 0
Film Sheaths extra 5/- per dozen.	
Extra Plate Sheaths, 4/6 per dozen.	

Can be fitted with lenses by other makers, prices on application.

Also made in 5 × 4 and 1/2-Plate sizes.

A set of three Magnifiers to enable the user to take near objects at either 3.6, or 9 feet are supplied in leather case for 5/- Single Magnifiers, 2/- each. For portraiture these are almost indispensable.

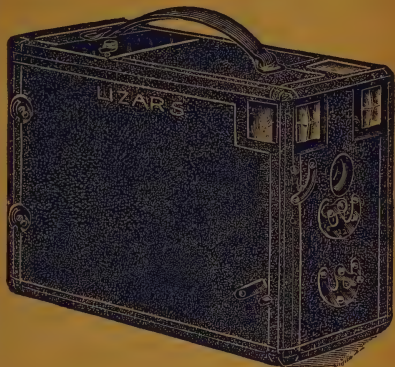


42s.

LIZARS' "CHALLENGE" MAGAZINE CAMERA.

42s.

This high-class Camera is capable of carrying 12 $\frac{1}{2}$ -plates or 24 cut films. Made of thoroughly seasoned Spanish Mahogany, and covered in hard-grained leather. An improved ever-set shutter to work time so long as desired, and give instantaneous exposures from a 10-th to a 60-th part of a second. A graduated scale, giving the various speeds of the shutter, is attached and regulated from the outside. The Achromatic View Lens is of very superior quality, giving fine definition, and the diaphragms, which rotate inside, are actuated by a lever fixed to the front, the different apertures being indicated on a metal scale. Brilliant view finders, one for the horizontal and the other for vertical pictures; also bushes, so that the Camera may be used on a stand, are let into the body of the instrument. The changing arrangement is most perfect and reliable and permits of the sheaths being inserted in any order, a decided advantage when loading. Attached to the changer is an automatic register showing the number of plates which have been exposed.



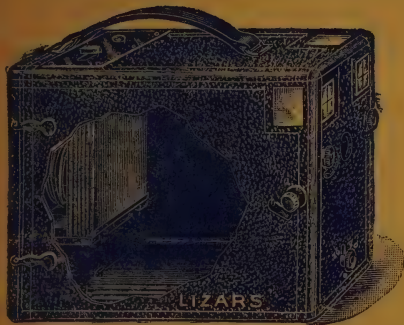
A set of three magnifiers to enable the operator to photograph objects at 3, 6, and 9 feet, and very useful for portraiture, are fixed to the front of Camera and manipulated by means of a lever on the outside.

As an inexpensive Camera to give high-class results it cannot be surpassed. Also made in 5x4 and $\frac{1}{2}$ -plate sizes. Film Sheaths extra, 5/- per dozen. Extra Plate Sheaths, 4/6 per dozen. Waterproof Mailcloth Canvas Case, with hand and shoulder straps, to hold Camera, 5/6.

21s.

LIZARS' "CHALLENGE" MAGAZINE CAMERA.

21s.



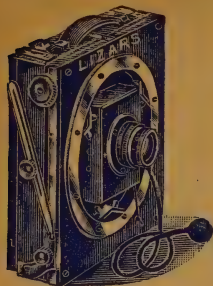
The Camera is thoroughly well made and neatly covered in Morocco grained. Carries 12 $\frac{1}{2}$ -plates or 24 films, and fitted with high-class Achromatic View Lens. The changing arrangement is absolutely certain, and the sheaths may be inserted in any order. Automatic plate register. Ever-set shutter, giving time and instantaneous exposures, the speeds for the latter varying from a 10-th to a 60-th part of a second, and regulated from the outside on a carefully marked indicator. The diaphragms are rotated from the outside, and scaled for the different apertures. Brilliant view finders for horizontal and vertical pictures are set into the Camera; also bushes, so that it may be used on a tripod in either position. The Camera is absolutely free from complications, and can be used with great success by the youngest novice. Also made in 5x4 and $\frac{1}{2}$ -plate sizes.

Film sheaths extra, 5/- per dozen. Extra plate sheaths, 4/6 per dozen.

Magnifiers for adapting to the Camera lens for photographing near objects, and very necessary for portraiture set of three, 3, 6, and 9 feet, complete in case, 3/9. Single Magnifiers, 1/6 each.

Waterproof Canvas Case, with hand and shoulder straps, to hold Camera, 5/6.

SEE PRECEDING AND FOLLOWING PAGES.



LIZARS' 'NEW CHALLENGE' STAND CAMERAS

Now fitted with Turntable and Time and Instantaneous Shutter, without Increase in Price.

This Outfit is altogether unprecedented in **Price, Quality, and Workmanship**, and no Photographic Set has been placed on the market that could ever compare favourably with it.

SPECIFICATION.

Camera made of thoroughly seasoned, beautifully figured, and finest *Spanish Mahogany*, not the cheaper *Honduras Mahogany* which is often to be found in this competing class of Instrument. The Back of the Camera moves forward on brass (not wood) guides, to allow the use of wide angle Lenses. The Camera is also provided with square panel front (detachable), swing back, reversing back, rising front, and long double-extension leather bellows. It is fitted with Turntable fixed in Baseboard, as shown in woodcut, which makes it absolutely rigid, the weight being equally proportioned when on the stand.

Slide has Rabbed Frames, also Triple-Jointed Hinge Rabbed Shutters, which is a great preventive from light in the event of the hinge-cloth getting worn; further, the Shutter, when pulled open, is stopped by an Automatic Spring bearing the whole way across, in place of the usual metal screw stops.

Lens is Rapid Rectilinear, of fine quality, working at F/8, and fitted with Iris Diaphragm.

Shutter is of the well-known Roller-blind pattern, which works either time or instantaneous, with Speed Indicator of the latest form.

Stand is 3-fold, with sliding bottom joint and spring clips, thoroughly well made, and perfectly rigid.

The Outfit, which consists of Camera, R.R. Lens, Shutter, Stand, and Book-form Double Dark Slide, has been thoroughly and carefully designed for general usefulness, combined with portability, and an Outfit of such superior quality and workmanship as that which I have placed before the photographic public is unsurpassed at the price.

PRICE.

Particulars.	Size $4\frac{1}{2} \times 3\frac{1}{2}$ $\frac{1}{4}$ -plate	5×4 and $6\frac{1}{2} \times 4\frac{3}{4}$ $\frac{1}{2}$ -plate	$8\frac{1}{2} \times 6\frac{1}{2}$ 1/1 plate	10×8	12×10	15×12
	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Complete Outfit as Specification	£3 0 0	£3 10 0	£5 10 0	£8 0 0	£10 10 0	£13 10 0
Extra Double Book Slides, each	0 8 6	0 10 0	0 12 6	0 16 0	1 0 0	1 4 0
Camera, with Turntable only ...	£1 9 6	1 12 0	2 15 0	3 12 0	4 8 0	5 13 0
Camera, with Turntable and One Double Book Slide only ...	£1 18 0	2 2 0	3 7 6	4 8 0	5 8 0	6 19 0
Camera, with Turntable and 3-fold Tripod only ...	£1 17 0	2 1 0	3 6 0	4 7 0	5 5 0	6 15 0
Camera, with Turntable, Double Book Slide, 3-fold Tripod, and Roller-Blind Shutter only ...	£2 12 0	2 18 6	4 10 6	5 18 0	7 5 0	9 0 0

Carrying Cases for "New Challenge" Cameras.

Waterproof Mailcloth Canvas Case, to hold Camera and Three Slides ...	0 4 6	0 5 6	0 7 6	0 11 0	0 13 0	0 15 0
---	-------	-------	-------	--------	--------	--------

SPECIAL.—The Half-Plate Outfit can now be supplied with Ross' Aplanat Lens, with Loose Flange (which alone is listed at £4), for £5 10s.

With Taylor, Taylor & Hobson's R.R. Lens, for £5.

With Taylor, Taylor & Hobson's R.R. Lens and Bausch & Lomb's famous "Unicum" Shutter in place of Roller-Blind Shutter, for £6.

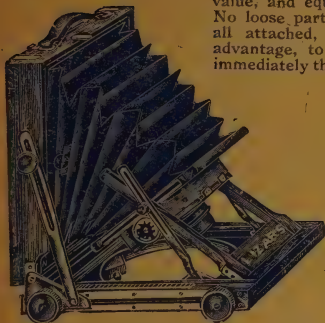
Brass Bound $\frac{1}{2}$ -Plate Outfit, 20/- additional. Extra Slides for same, 13/9 each.

†Note. The $\frac{1}{4}$ -plate Camera is slightly modified in form to close more compactly and has no Turntable

SEE PRECEDING AND FOLLOWING PAGES.

LIZARS'

"CHALLENGE" COMBINATION STAND CAMERA.



The "Challenge" Combination Camera is of unprecedented value, and equal to the highest-priced instruments in the market. No loose parts to go amissing, the Lens, Shutter, and Camera are all attached, and fold up together. It is, therefore, a decided advantage, to have everything in its place, and ready for action immediately the Camera is opened.

SPECIFICATION.

Camera made of thoroughly seasoned, beautifully figured, and finest Spanish mahogany, finished in the best style of workmanship; the brass work is highly finished and lacquered, and the bellows is varnished cross-grained leather, which makes the whole outfit of superior quality and design. The back of the Camera moves forward by means of a rack and pinion for the use of wide angle Lenses. The base-board is also extended by the front rack and pinion, thus giving the advantage of rack focussing for the whole extension. A reversing back, swing back, and swing front are provided. and the front may be raised to bring the Lens to the top of the plate or angled into any required position. The extension of

the Camera is such as to permit of Lenses from $4\frac{1}{2}$ to 16 inches focus being used. It is fitted with turntable fixed in baseboard, which makes it absolutely rigid, the weight being equally proportioned when on the stand. The pins to which the tripod is attached are fixed to the turntable, thus doing away with the necessity of a stand-top and screw.

Slide, which is a double book form, has rabbeted frames, also triple jointed hinge rabbeted shutters, which is a great preventative from light being admitted in the event of the hinge-cloth getting worn: further, the shutter when pulled open is stopped by an automatic spring bearing the whole way across, in place of the usual metal screw stops. This addition makes it almost impossible for light to enter between the shutter and frame of the slide.

Lens is of the rapid rectilinear form, works at F/8, and fitted with Iris diaphragm.

Shutter is a "Challenge" roller blind, to work either time or instantaneous, with speed indicator of the latest form attached. The shutter forms part of the front of the Camera, and is fitted with a loose lens panel, which may be instantly replaced by one for any other lens when required.

Stand is three-fold, with sliding bottom joint and spring clips, thoroughly well made, compact, and perfectly rigid.

Case or Bag to hold the outfit is of the best waterproof canvas, and has shoulder and hand strap attached.

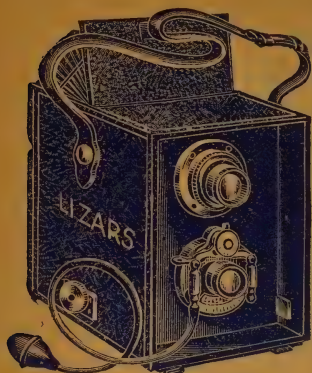
The Outfit is altogether the most unique and perfect of its class in existence, and consists of Camera, lens, time and instantaneous shutter with speed indicator, with double dark slide stand, and carrying case, all of the finest workmanship.

Price for Complete Outfit as per Specification.

Half-Plate size, fitted with "Challenge" R.R. Lens,	£5 10 0
" " " Taylor & Hobson Lens.	7 0 0
" " " Ross' Aplanat Lens, with Loose Flange } (which alone is listed at £4).	7 15 0

Extra Dark Slides each 12/6. Extra Lens Panels to fit Shutter, 1/6 each.

Whole-Plate size, fitted with "Challenge" R.R. Lens, £8 10. Extra Dark Slides, each 15/-



LIZARS' "CHALLENGE" TWIN-LENS CAMERA.

Made in finest Spanish Mahogany, and covered in morocco leather. Focussed by rack and pinion. Image always on view, and is an exact counterpart of the one transmitted by the second lens to the plate or film. The shutter is the well-known roller-blind pattern, time and instantaneous, with Speed indicator attached. Can be used equally well for hand or stand work, and for both purposes very greatly improved focussing hoods, so as to most perfectly shade the ground glass, are attached—a great desideratum, especially when taking instantaneous pictures. This Camera is much smaller than the majority of those on the market, and made entirely on scientific principles, although very low in price.

ADVANTAGES DERIVED BY USING THE TWIN-LENS CAMERA.

The object to be Photographed can be focussed up to the last moment of exposure. The full size of the subject being on view, composition can be studied, and correct centering, so desirable when photographing moving objects, &c., is a certainty. When used on a Tripod it is in every way as handy and complete as an ordinary Field Camera. With such an instrument the beginner cannot make failures.

PRICE.

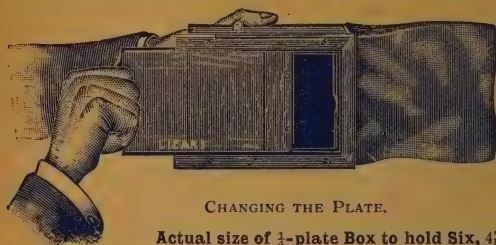
Quarter-Plate size, with Three best Book Form Double Dark Slides, Shoulder Strap, and pair of firstclass Iris R.R. "Challenge" Lenses	...	...	...	...	...	...	...	...	...	£6 6 0
Quarter-Plate size, with Taylor & Hobson Lenses	...	...	...	...	...	...	...	...	...	8 8 0
Quarter-Plate size with Ross Rapid Hand Camera Lenses	...	...	...	...	...	...	...	...	...	10 10 0
Quarter-Plate size, with Ross-Goerz Lenses	...	...	...	...	...	...	...	...	...	14 14 0
5×4 size, with "Challenge" R.R. Lenses	...	...	...	...	...	...	...	...	...	8 8 0
5×4 size, with Taylor & Hobson Lenses	...	...	...	...	...	...	...	...	...	10 10 0
5×4 size, with Ross Rapid Hand Camera Lenses	...	...	...	...	...	...	...	...	...	12 12 0
5×4 size, with Ross-Goerz Lenses	...	...	...	...	...	...	...	...	...	17 10 0
Half-Plate size, with "Challenge" R.R. Lenses	...	...	...	...	...	...	...	...	...	10 10 0
Half-Plate size, with Taylor & Hobson Lenses	...	...	...	...	...	...	...	...	...	12 12 0
Half-Plate size, with Ross-Goerz Lenses	...	...	...	...	...	...	...	...	...	18 10 0
For Camera and Shutter only	1/2-plate, £4 10/; 5×4, £5 10/; 1/2-plate	...	...	...	...	...	...	...	...	6 15 0
For Camera, Shutter, and Three Slides	1/2-plate, £6 0/; 5×4, £7 3/; 1/2-plate	...	...	...	...	...	...	...	...	8 10 0
For Extra Double Book Slides, each	1/2-plate, 11/; 5×4, 12/; 1/2-plate	...	...	...	...	...	...	...	...	0 12 6
Daylight Cartridge Film Holder, including fitting to Camera, and Interchangeable with Dark Slides	1/2-plate, £1 3/; 5×4, £1 3/; 1/2-plate	...	...	...	...	...	...	...	...	1 11 0

	1/2-plate	5×4	1/2-plate
Outside dimensions of Camera, including Focussing Hoods	7×6 1/2×5 1/2	8 3/4×8 3/4×6 1/2	10×9 3/4×8
Weight of Camera, including Lenses, Shutter, and Focussing Hoods	3 lb. 7 oz.	4 lb. 7 oz.	6 lb. 12 oz.

Note—If fitted with the famous Bausch & Lomb Shutter, as shown in Woodcut, 1/2-plate and 5×4, 20/ extra; 1/2-plate, 30/ extra.

SEE PRECEDING AND FOLLOWING PAGES.

LIZARS' "CHALLENGE" CHANGING BOX.



CHANGING THE PLATE.

Actual size of $\frac{1}{4}$ -plate Box to hold Six, $4\frac{1}{8} \times 3\frac{1}{2} \times 1\frac{1}{8}$ inches.

The advantages claimed for this box are simplicity, durability, cheapness, and absolute perfection in the changing arrangement. There are no mechanical appliances or springs to go wrong, the whole working being so simple as to preclude the possibility of a plate sticking when the box is in use, the plate being in perfect register during exposure. The plates are carried in metal sheaths, with an improved indicator for showing the number of plates exposed.

The box is exceedingly compact and beautifully finished in polished mahogany, or covered in hard-grained leather, and lined with steel, which effectually prevents wear and tear. Films can be substituted for plates by using card backing in the sheaths.

Price, complete with sheaths for plates fitted to my own Cameras.

	With leather bag.		With cloth bag.	With leather bag.
$\frac{1}{4}$ -plate (to carry 6 plates or films),	£0 18 6	$\frac{1}{4}$ -plate (to carry 12 plates or films),	£0 18 6	£1 2 0
5×4 plate	1 2 6	5×4 -plate	1 1 6	1 6 6
$\frac{3}{4}$ -plate	1 5 0	$\frac{3}{4}$ -plate	1 1 6	1 6 6

Fitting to Cameras other than my own make, 2/6 each extra.

When using films one glass plate must be placed at the back of the last sheath to ensure rigidity and to prevent the springs buckling the films.

This is the most perfect and cheapest Changing Box in the market.

Photographic, Lantern, and Optical Catalogues free on application. The
Largest Manufacturer and Dealer in High-Class Instruments in Britain.

J. LIZARS, Manufacturer of Photographic, Optical, and Scientific Instruments.

GLASGOW	101 and 107 Buchanan Street.
LONDON	20 High Holborn, W.C.
EDINBURGH	13 and 19 Shandwick Place.
BELFAST	8 Wellington Place.
ABERDEEN	171 Union Street.
SOUTH AFRICA	Capetown
Factory, Golden Acre Works, Cragnestock St. Glasgow.	

Telegraphic Address:

LIZARS	GLASGOW.
CAMERATED	LONDON.
OPTICAL	EDINBURGH.
LIZARS	OPTICIAN, BELFAST.
LIZARS	OPTICIAN, ABERDEEN.

LIZARS'
"CHALLENGE"
CAMERAS

INDEX TO ADVERTISERS.

ACTIEN Gesellschaft für Anilin Fabrikation, The—Developers, &c. **1515 to 1522**
Adams & Co.—Photo Stores **339 to 370**
Aerograph Company, Ltd., The—
 'Aerograph' Air Brush **316**
Ahuja, D. A.—Photo Dépôt **1493**
Airbrush Manufacturing Co., The—
 Airbrush **1493**
Aldham, E. Laver—Enlargements and Finishing **1275**
Aldis Bros.—The 'Aldis' Anastigmat Lens. **313**
Allan, David—Manufacturer of Photo Requisites in Metal and Wood **1342, 1343**
Allen, W.—Allen's 'Ideal' Field Camera, Mahogany Dark Slides **328**
Altrincham Rubber Company—The 'Sanderson' Shutter, Camera Cases, &c. **1534 to 1536**
Amateur Photographer's Intelligence Society, The **333**
AMERICAN AMATEUR PHOTOGRAPHER, THE **1529**
American Photographic Publishing Co., The **1493**
Anthony and Scovill Co., The—Manufacturers of Photo Requisites **1512, 1513**
Archer & Sons—Optical Magic Lanterns, Slides, &c. **1199**
Arundel & Marshall—Light-tight and Parcel Post Boxes, Tubes, &c. **566**
Ash, Percy—Photographic Dealer and Importer **1493**
Ashford, J.—Patent Adjustable Tripod Stand, the 'Newford' Exposing Apparatus **1201**
Atkinson Bros.—Photo Specialities **1444**
Autocopyist Company, The—The Photo-Autocopyist **313**
Autotype Company, The—
 'Autotype' Tissues and Materials for the Permanent Carbon Process **1467 to 1474**
BABAJEE, Sakham & Co.—Photo Dépôt **1480**
Baird, A. H.—'Lothian' Stereoscope, Todd-Forrest Magnesium Flash Lamp, &c. **307 to 309**
Baker & Rouse Proprietary, Ltd., The—Importers of Photo Materials, &c. **1538, 1539**
Baker, W. R.—Changing Bag and Developing Tent **1335**
Barclay & Sons, Ltd.—Enlarging and Reducing Apparatus **326**
Barnett, J., & Co.—Importers and Dealers in all Photo Requisites **1483**
Bates, Wm.—Photo Black Varnish and New Dead Black **327**
Beardsley, E. & Son—Importers of Photo Requisites **1479**

Beck, R. & J., Ltd.—'Frena' Cameras, Beck-Steinhilf Lenses, &c. **203 to 210**
Bender & Co.—Wholesale Dealers in Photo Materials **1514**
Benetfink and Co.—Photo Dépôt **475 to 485 and 1278**
Beresford, F.—Developing Tent, Changing Bag, Focuser, &c. **324**
Blees, John—Manufacturer and Importer of Photo Goods **1479**
Blundell, J., J. J., & T. G.—Residues, Refiners, &c. **584 to 586**
Boyd, Kaye & Co.—Photo Dépôt. **1481**
Bramwell, E., & Son—Photo Chemical Manufacturers **333**
Brin's Oxygen Company, Ltd.—Oxygen, Cylinders, &c. **318**
Britannia Works Company, Ltd., The—see Ilford, Limited.
BRITISH JOURNAL OF PHOTOGRAPHY—
 Advertisement Scale of Charges **1276**
BRITISH JOURNAL OF PHOTOGRAPHY—
 Subscription Scale of Charges. **1530**
Brooks-Watson Daylight Camera Company **1495 to 1498**
Brooks, Wm.—Collodion Emulsion, &c. **333**
Brown, Scott & Company—Mounts, Frames, &c. **20 to 23**
Brown, J.—Caramel Sienna Tissue **319**
Bruce, T. S.—Trade Retoucher, Lessons in Retouching, Retouching Materials **30**
Buchanan, W. P.—Backgrounds **1494**
Bullen, H. E.—'Bos' Sensitized Albumen Paper **469**
Buncle, James—Photo Dépôt **1337**
Burgess & Leigh—The New Porcelain Photo Trays **552**
Burr, Charles—Lenses **1531**
Busch Camera Co.—Hand and Stand Cameras for Plates and Films **461 to 468**
Butcher, W., & Sons—Photo Stores **223 to 230**
Butt (John Ede) and Sons—Moulding, &c., Manufacturers. **1531**
CADETT & Neall, Ltd.—'Cadett' Plates, Papers, &c. **329 to 332**
Camstand Co.—The 'Camstand'. **1533**
Chapman, J. T.—'British' and 'Express' Cameras, 'Kalee' Shutter, &c. **560 to 563**
Chee, A., & Co.—Photo Dépôt **1481**
Chippier, W. C.—Second-hand Apparatus Dealer **1528**
Christie, James.—Specialities for Lantern Outfitters, &c. **1274**
Clément and Gilmer—Lenses, Cameras, Projection Machine, &c. **1500 to 1509**

Coe Collotype Printing Co. . . . **1454**
 Contents Index . . . **1191** to **1197**
 Cornthwaite, H.—'X. L. C. R.'
 Roller Burnishers and Photo
 Requisites **1546**
 Curtis Optical & Photo Co.—
 The 'Trinity' Cameras . . . **320**

DALLMEYER, J. H., Ltd.—
 Lenses, Cameras, Apparatus,
 &c. . . **1198** and **1547** to **1562**
 Day, Geo.—Emmerson's Patent
 Head-rest **1452**
 Dukle, D. M., & Co.—Photo Stores **1492**
 Dunmore, W. E.—Photo Apparatus
 Exchange and Auction . . . **31**

EDWARDS, B. J., & Co., Ltd.—
 Dry Plate and Film Manu-
 facturers **1277**
 Edwards, Austin—
 Roll and Flat Films . . **558, 559**
 Elliott & Sons, Ltd.—Plates, Films,
 Papers, Enlargements, &c.
599 to **614** and **678**

Elliott, C. E.—
 City of London Photo Stores . **1341**
 Ellis (Alfred) & Walery—
 'Paragon' Retouching Medium
 and Photo Materials **315**
 Emery, Wilfred—
 Photo Dealer, &c. **1499**
 Epstein & Co.—
 Frames, Mounts, Mouldings, &c. **319**
 European Blair Camera Co., Ltd.—
 'Blair' Films and Plates **587** to **592**
 Evenden, Geo.—
 Patent Mount Cutter **1529**

FAIRBANKS, Lavender & Son—
 Leather and Canvas Camera
 Cases, &c. **1544**
 Fallowfield, J.—
 Photo Stores **1319** to **1334**
 Fincham, Philip H.—
 Optical Lantern Slides, &c. . . **327**
 Fitch & Co.—Flat Films, &c. . . **1206**
 Fraser & Elrick—The Edinburgh
 Photographic Warehouse . . **1450**
 Fuerst Bros.—Hauß's Developers,
 Photo Chemicals, &c. **29**

GANDOLFI, Louis—Photo Ap-
 paratus Manufacturer . . . **448**
 Gardner, C. E., & Co., Ltd.—
 Wholesale Druggists and Dealers
 in Photo Supplies **1492**
 Gaumont, L., & Co.—Cinematog-
 raphs, 'The Oxygenator,' 'Elgé'
 Arc Lamp, &c. **24** to **27**
 'Gem' Dry Plate Co., Ltd.—
 Manufacturers of Photo Plates
 and Papers **1273**
 Goerz, C. P.—Lenses, Cameras,
 Binoculars, Shutters, &c. **395** to **402**
 Govan, Minott M.—
 Silent Portrait Shutter, &c. . **1499**
 Greenwood, Henry, & Co.—
 Publishers **1276, 1530** and **1546**
 Guerry, Cl.—Single and Double-
 Flap Pneumatic Shutters . . **1490**

Guterman, S., & Co., Ltd.—Cellu-
 loid and 'Texoderm' Imitation
 Leather **1348, 1349**

HAMPTON & Co.—
 Photographic Publishers . **1452**
 Hardtmuth, L. & C.—'Koh-i-Noor'
 Retouching Pencils and Semi-
 Porcelain Dishes **325**
 Harrington & Co., Ltd.—
 Photographic Merchants and
 Publishers **1482**
 Harrington Bros.—
 Photo Chemicals **598**
 Hastings, Godfrey—
 Pictorial Postcards **1545**
 Hayes, F. T.—Artist, Enlarger and
 Photo Dealer **315**
 Henderson, James—
 Wholesale Photo Dealer . . . **321**
 Hinton & Co.—Photo Apparatus
 and Chemical Stores . . **239** to **242**
 Holmes Bros.—Photo Apparatus
 Manufacturers **1454**
 Hood & Co., Ltd.—
 Photo Engravers, Printers and
 Designers **403** to **406**
 Hora, Tudor T., & Co.—Cameras,
 Lenses, Shutters, Outfits, &c.
439 to **446**
 Horton, B. W.—'Scroll' Patent
 Roller Blind Shutter **1454**
 Houghton, Geo., & Son—Photo
 Manufacturers and Dealers
371 to **386**

Hub Scenic Co., The—
 Backgrounds, &c. **1540**
 Hughes, W. C.—Cinematographs,
 Lanterns, Jets, &c. . . **431** to **438**
 Hülsen, Julius, & Co.—
 Hyposulphite of Soda **315**
 Hume, Wm.—Cantilever Enlarging
 Apparatus, Objectives, &c.
1570 to **1575**

ILFORD, Limited—
 'Ilford' Plates, Papers, Films,
 and Camera, &c. **567** to **582** and
1081 to **1092**
 Illingworth, Thos., & Co., Ltd.—
 Carbon Tissues and Materials,
 Enlargements, Framing, &c.
151 to **158**

Index to Contributors . . . **1197, 1198**
 Index to Postal and Telegraphic
 Addresses **1263** to **1272**
 Infalible Exposure Meter Co., The
 —Exposure and Print Meters
1338 to **1340**
 International Oxy-generator Syn-
 dicate, Ltd.—The 'Ever-ready'
 Oxygen Generator **1566**

JENKINS, H.—Lantern Slides . **1275**
 Johnson, Wm., & Sons—
 Photo Album Makers **1466**

KAMM, L., & Co.—
 The 'Kammatograph,' &c. . **1543**
 Keene, Richard, Ltd.—
 Photo Apparatus Dealers, &c. . **1337**

Kindermann, C. F., & Co.—
Cameras, Accessories, &c. .. **1523**
Kleinmann, H., & Co.—
Collotype Printers **1545**
Kodak, Ltd.—'Kodak' Papers,
Films, Cameras, &c. .. **231 to 238**,
also front Cover
König, Otto, & Co.—Photo Papers
322, 323 and 1486, 1487
Krauss, E.—The New 'Takyr'
Camera, The 'Unar' Krauss-
Zeiss Lens, &c. **1491**
Kuntzen, H., & Co.—
Wholesale Manufacturers **1499**

LANCASTER, J. & Son—Lenses,
Cameras, Outfits, &c. **486 to 550**
and **616 to 641**
Levy, Max—The 'Levy' Screen .. **1510**
Lizars, J.—Manufacturer of 'Chal-
lenge' Photographic Apparatus
1239 to 1254
London Stereoscopic & Photo Co.,
Ltd.—Lenses, Cameras, Field
Glasses, &c. **1259 to 1262**
Lonsdale Bros.—
Camera Fittings, &c. **321**
Lumière N. A. Co., Ltd., The—
Plates, Papers, Films, Chemi-
cals, &c. **32, 33**

MACKENZIE & Co.—Daylight
Slides and Envelopes **557**
Manchester Photo Enlarging Co. **1337**
Marion & Co., Ltd.—Plates, Films,
Papers, Mounts, Cameras, &c. **4 to 19**
Martin, J. & Co.—Enlarging, Print-
ing, Copying, &c. **317**
Mawson & Swan—Plates, Films,
Collodion, Varnishes, &c. .. **1438 to**
1441, 1443 alternate to **1457**,
1458 to 1461, also outside back
Cover.

McLellan, J. W.—Lantern Slides **1545**
Mendel, Charles—
Photographic Publisher **1488, 1489**
Middlemiss, Wm.—
The 'Koresco' Camera **1532**
Miller, T., & Son—
The 'Adelphi' Hand Camera .. **1275**
Moore, De Saulles & Co.—Opaline
Glasses, Cutting Shapes, &c. .. **447**
Moorse, H.—Cameras, Apparatus,
&c., Manufacturer **1542**
Morgan & Kidd—Papers, Plates,
Enlargements, Collotype, &c.
215 to 222 and 642 to 653
Morley & Cooper—New and
Second-hand Lenses, Cameras
and Lanterns **334, 335**
Moss, R. J., & Sons—Acetylene
Generators, Jets, Trays, &c. .. **1563**
Myers & Frost—Enlargements .. **1337**

NADKARNI & Co.—Photo-
graphic, Drawing and
Artists' Materials **1483**
Nelson, Dale & Co., Ltd.—
Photographic Gelatine **311**

Newman & Guardia, Ltd.—
'N. & G.' Hand and Stand
Cameras, Accessories, &c. **115 to 150**
New Zealand Camera Co. **1546**

OZOTYPE Company—Carbon
Printing Process Materials .. **314**

PALMER, W. E., & Sons—
Enlarging and Printing .. **474**
Park, Wm.—Importer of Photo
Goods, Magic Lanterns, &c. .. **1479**
Peck, Edward—'Sarum' Lenses,
Mounts, &c. **1335**
Perkin, Son, and Co., Ltd.—
'Optimus' Lenses, Cameras,
Lanterns, Optical and Scientific
Apparatus, &c. **167 to 198**
Photographer's Companion—
Edward Dunmore **1546**
Photo Jewelry Manufacturing Co.,
The—Photo Buttons, Medallions,
Button Machines, &c. **1541**
PHOTO REVUE, THE **1488**
Piggott, John—Photo Stores .. **1336**
Polytechnic Institute—School for
Photography **1578, 1579**
Postal and Telegraphic Addresses
1263 to 1272
Preston, Job—Photo Stores
317 & 1494
Prestwich Manufacturing Co.,
The—Cinematographs, &c. .. **1448**
Purser, Hy. F.—'Busch' Lenses,
Binoculars, &c. **449 to 460**

RAINES, Alfred and Co.—Artists,
Enlargers, Printers, and Half-
tone Block Engravers .. **99 to 114**
Reynolds and Branson, Ltd.—The
'Ryston' Dark Room Lamps,
Developers, &c. **1442**
Robinson & Co.—Photo Dépôt .. **1492**
Rochester Optical & Camera Co.,
The—The 'Pony Premo' New
Folding Pocket Camera, &c.
1452 to 1465

Rogers & Webster—Frames .. **311**
Rosenberg, A., & Co.—
The 'Perfecto' Steel Tripod .. **1349**
Rosenstiel, Otto—Photo Papers .. **311**
Ross, Limited—Lenses, Cameras,
Lanterns, Outfits, Binoculars,
&c. **35 to 98, 583**,
also front Cover.

Rotary Photographic Co., Ltd.,
The—'Rotograph' Bromide
Papers, Developer, &c. **34**
Rouch, W. W., & Co.—'Eureka'
and 'Excelsior' Hand Cameras,
Developers, Outfits, &c. **2, 3**,
and **1576, 1577**
Rudowsky, C. A.—Photo Dealer .. **311**

SALMON & Son—Vignetter,
'Mulum' Dish Rocker, &c... **28**
Sandell Films & Plates, Ltd.—
'Cristoid' Films, Plates, &c.
1567 to 1569

Sands, Hunter & Co.—Second-hand Photographic Apparatus **1350**
 Schering's Photographic Chemicals **1344, 1345**
 Scholzig, Otto—Papers and Plates **319**
 Scory, J.—Photographic Glass **1479**
 Seabrook Bros. & Co.—The New 'Wizard' Cameras, &c. **596, 597**
 Service Photographic Society—Hand and Stand Cameras, &c. **1456**
 Sharp & Hitchmough—'Aptus' Cameras, Lenses, Lanterns, Backgrounds, &c. **1351 to 1434**
 Sheffield Photo Co.—Photo Stores **1446**
 Sheffield Smelting Co., The—Residues, Refiners, &c. **593 to 595**
 Shepherd (Sanger) & Co.—Apparatus for Natural Colour and Orthochromatic Photography **1346, 1347**
 Shew, J. F., & Co.—Photo Stores **387 to 394**
 Sichel, O., & Co.—Cameras, Backgrounds, Mounts, &c. **1204**
 Smedley & Co.—Photo Stores **243 to 306**
 Smith & Sons—Smith's Patent Bromides **1531**
 Smith, R. F.—Photo Dépôt **1529**
 Sparrow, J.—Photo Dépôt **1499**
 Spencer, John—Exporter and Shipper **556**
 Staley, A. E., & Co.—Bausch & Lomb's Shutters and Lenses, Focussing 'Weno' Camera, &c. **564, 565**
 Steinbach & Co.—Photographic Papers **322, 323, and 1486, 1487**
 Steward, J. H.—Optical Lanterns, Arc Lamp, &c. **310**
 Strangeways & Sons—Printers and Photo-Etchers **199 to 202**
 Suckling, Walter—Photo Stores **1545**

TALBOT & Eamer—The 'Miral' Hand and Stand Cameras **1436, 1437**
 Talbot, Romain—'Essemm Klapp' and 'Bott' Cameras **1484, 1485**
 Taylor, Taylor & Hobson, Ltd.—'Cooke' Lenses **1202, 1203**
 Taylor, Tunnickliff & Co., Ltd.—'Granitine' Dishes, Plate Washer, Drainer, &c. **336, 337**
 Tella Camera Company, The **31**
 Thomas, R. W., & Co., Ltd.—Plates, Films, Developers, &c. **1200**
 Thornton-Pickard Manufacturing Co., Ltd., The—Shutters, Cameras, Lenses, &c. **1279 to 1318**
 Turner, H. G.—Carriers for Cameras, &c. **1527**
 Tylar, William—P. O. P. Washer, 'Dreadnought' Generator, &c. **312**

Tyler (Chas.) & England Bros., Ltd.—Manufacturers of Photo Mounts, Cameras and Sundries **1475 to 1478**

Tyler, Walter, & Co.—Optical Lanterns and Slides **555**

UNDERWOOD, E. & T.—Photo Apparatus Manufacturers **472, 473**

VANGUARD Manufacturing Co.—Chemical Preparations for Photographers **1205**

Vereinigte Fabriken Photographischer Papiere—Albumenised Paper, 'Kosmos' P. O. P., &c. **1524, 1525**

Voigtländer & Sohn—Manufacturers of Lenses, Cameras, &c. **1564, 1565**

WACHTL, Bernhard—Photo Cards and Materials **1481**

Wallis Bros.—The 'Penna' Cameras, Shutters, &c. **163 to 166**

Wallis, Edmond—Accessories and Backgrounds **327**

Watkins' Meter Co.—Exposure and Print Meters, &c. **470, 471**

Watson, W., & Sons—Opticians, Photo Apparatus, Scientific Instruments, &c. **1207 to 1238**

Wellington & Ward—Wellington Photographic Papers and Films **407 to 430**

Wells & Co.—Stamp Photographs, Enlargements, &c. **321**

Wesson, Ernest, & Co.—Paper Importers and Mount Manufacturers, &c. **159 to 162**

White, Otis C.—Studio Requisites for Posing and Lighting **1511**

Williams, J. Arthur—'Magnalium' Metal **1546**

Willway, J. S., & Sons—Gwyer's Limelight Jets, Pendant Saturator, &c. **551**

Woolley, Jas., Sons & Co., Ltd.—'Victoria' Cameras, Backgrounds, &c. **211 to 214**

Wratten & Wainwright—'London' Dry Plates, &c. **338, 1435, also 584 to 595**

ZEISS, Carl—Lenses, 'Palmos' Hand Cameras, &c. **1537**

Zimmermann, A. & M.—Schering's Pyro and Developers, &c. **1344, 1345**

Zimmermann, Chas., & Co.—Chemicals, Developers, Papers, Plates, Cameras, Accessories, &c. **1515 to 1526**

The Stereoscopic Company
are
WEST END AGENTS
FOR
The Goerz Anschutz
Ensign | **Frena**
Sanderson | **Weno**
Cameras.

Goerz Double Anastigmat Lenses.
Beck-Steinheil Telephoto Lenses.
Beck-Harris Spectrum Filter.

Full Particulars on Application.

106-108, REGENT STREET, W., and
... 54, CHEAPSIDE, E.C., LONDON.

The Stereoscopic Company's **SPECIALITIES are**

**The Twin Lens Carlton Camera,
The Twin Lens Artist's Camera,
The Twin Lens Magazine Camera,
The Carlton Hand Camera,
The Binocular Hand Camera,
The Regent Hand Camera,
The Sports Hand Camera.
The Zylo Hand Camera.**



Will customers kindly note that it is impossible to give full particulars of all the large and varied stock, but detailed catalogues can be had on application, and any particulars or information will be gladly given.

**A COMPLETE STOCK KEPT OF
Opera Glasses, Field Glasses, Marine Glasses,
Race Glasses, Monocular Telescopes,
Binocular Telescopes,
INCLUDING
Goerz Trieder Binoculars,
Voigtlander's Poro Binoculars,
Zeiss Prismatic Binoculars.
Stereoscopes and Graphoscopes.**

**THE LONDON STEREOSCOPIC COMPANY,
106 & 108, REGENT STREET, W.,
and 54, CHEAPSIDE, E.C**

Shippers, Dealers, and Merchants

SHOULD SEND TO THE

London STEREOSCOPIC Company,

54, CHEAPSIDE, E.C.,

FOR THEIR

**NEW LIST of PHOTOGRAPHIC APPARATUS
AND ACCESSORIES.**

Special lines in Cameras, Lenses, Field Glasses,
Barometers, &c.

The "Practical" Series of Cameras
FOR PLATES AND FILMS.

Prism Binoculars by all the Leading Makers
UPON THE VERY BEST TERMS.

*Correspondence invited and Estimates furnished for any and
every requisite for Photographic or other purposes.*

Please address all Trade inquiries to . .

P.A. Department,

LONDON STEREOSCOPIC COMPY.,

54, CHEAPSIDE, LONDON, E.C.

Commercial Department.

THE LONDON STEREOSCOPIC AND PHOTOGRAPHIC COMPANY, Ltd.

54, CHEAPSIDE, LONDON, E.C. Works: NEW SOUTHGATE, N.

Photo-mechanical Printers to all Trades & Professions.

**FACSIMILE REPRODUCTIONS in COLLOTYPE from any
SUBJECT PRINTED on PAPER or CARD.**

Portraits. Views. Buildings. Architects' Drawings. Statuary.
Machinery. Maps. Engravings. Old Manuscripts. Stamps. Coins.
Seals, &c., &c.

**PARLIAMENTARY ELECTION CARDS, Printed in Collo-
type or Half-Tone Blocks.**

Illustrations for Art Publications, Books & Periodicals, Trade Catalogues,
Show Cards, Christmas Cards, Programmes, Calendars, Menus, &c.

**ORIGINAL SUGGESTIONS FOR ADVERTISERS,
PUBLISHERS, and COMMERCIAL HOUSES.**

**PHOTOGRAPHIC PRINTS ON BROMIDE PAPERS,
Glossy or Matt Surface, for POST CARDS, CIGARETTE
STIFFENERS, PRINTS for Insets in Packets of TEA,
CONFECTIONERY, &c.**

PHOTOS FOR JEWELLERY AND FANCY GOODS.

Carbon, Platinotype and Silver Printing for Fine Art Trades.
Reproductions of Paintings, &c.

**HIGH-CLASS ARTISTIC PRINTING FOR ALL TRADES.
TRICHROMATIC PRINTING.**

**LETTERPRESS, HALF-TONE BLOCKS, LITHOGRAPHY,
ENGRAVING, Etc.**

*Specimens and Estimates sent on application. Full particulars as to
size of print, paper and quantity required should be given.*

Where possible, we would respectfully request the loan of the
Original Negative, as better results can be procured when making
Reproductions.

FRAMING of EVERY DESCRIPTION for ADVERTISERS.

POSTAL AND TELEGRAPHIC ADDRESSES.

NAME.	ADDRESS.	TELEGRAPHIC ADDRESS.
A ADAMS & Co.	26 Charing Cross Rd. W.C.	<i>PYRO, LONDON</i>
AEROGRAPH CO., LTD.	30 Memorial Hall Bgs., Farringdon St., E.C.	<i>AEROGRAPHY, LONDON</i>
ALBION ALBUM G. Co.	128 Sauchiehall Street, Glasgow	<i>ALBUMEN, GLASGOW</i>
ALDHAM, E. LAVER	Aythorpe Roding, Dun- mow, Essex	<i>LEADEN, RODING</i>
ALDIS, BROS.	13 Old Grange Road, Sparkhill, Birm'ham	<i>OPTICAL, BIRMINGHAM</i>
ALLAN, DAVID	Whitfield Works, Mans- field Street, Kings- land Road, N.E.	<i>PULTACEOUS, LONDON</i>
ALLEN, W.	York Rd., Maidenhead	<i>ALLEN, CAMERA MAKER, MAIDENHEAD</i>
ALTRINCHAM RUBBER Co.	Mossburn Buildings, Altrincham	<i>RUBBER, ALTRINCHAM</i>
ANGLO - AMERICAN VARNISH Co.	13 St. Paul's Square, Birmingham	<i>PIROXILIN, BIRMINGHAM</i>
ANTHONY & SCOVILL Co., THE	122-124 Fifth Avenue, 17th and 18th Streets, New York, U.S.A.	<i>TIVALVATE, NEW YORK</i>
APPLETON, R. J., & Co.	58 Manningham Lane	<i>OPTICAL, BRADFORD</i>
ARCHER & SONS	73 Lord St., Liverpool	<i>OPTIC, LIVERPOOL</i>
ARUNDEL & MARSHALL	Penn Street Works, Hoxton, London	<i>ARCHWAY, LONDON</i>
ASHFORD, J.	179 Aston Rd, Bir'gham	<i>GIRAFFE, BIRMINGHAM</i>
ASHMAN, W. M.	12A Old Bond St. Bath	<i>ASHMAN, PHOTO, BATH</i>
ATKINSON BROTHERS	66 Victoria Street	<i>PERFECTION, LIVERPOOL</i>
AUTOCOPYIST Co., THE	64 Queen Victoria St.	<i>AUTOCOPYIST, LONDON</i>
AUTOMATIC PHOTO PRINTING SYNDI- CATE, LTD., THE	Scots' Bridge Mill, Rickmansworth, Herts	<i>ACTINIC, RICKMANSWORTH</i>
AUTOTYPE Co., THE	74 New Oxford Street, W.C. and Brownlow Rd., West Ealing, W.	<i>AUTOTYPE, LONDON</i> <i>AUTOTYPE, EALING DEAN</i>
B BAIRD, ANDREW H.	33-39 Lothian Street, Edinburgh	<i>BAIRD, LOTHIAN STREET, EDINBURGH</i>
BAKER & WRIGHT	48 Patrick Street, Cork	<i>BAKER, CORK</i>
BAKER, W. R.	9 Belmont Road, Wal- lington	<i>W. R. BAKER, WALLINGTON</i>
BAMFORTH, JAMES	Holmfirth, Yorks	<i>BAMFORTH, PHOTO, HOLMFIRTH</i>
BARCLAY & SONS, LTD.	95 Farringdon St., E.C.	<i>YALCRAB, LONDON</i>
BATES, WM., & SON	East Street, Chertsey	<i>BATES, PHOTO, CHERTSEY</i>
BAYNTON, C. S.	Exchange Buildings, New St., Birmingham	<i>BAYNTON, EXCHANGE BDGS., BIRMINGHAM</i>
BECK, R. & J., LTD.	68 Cornhill, E.C.	<i>OBJECTIVE, LONDON</i>
BEERNAERT'S DRY PLATE Co.	234 & 235 Allée Verte, Gand, Belgium	<i>BERNARDINØ, GHENT</i>
BEMROSE & SONS, LTD.	Midland Place, Derby	<i>BEMROSE, DERBY</i>
BENDER & Co.	4 Snow Hill, London	<i>BEMROSE, LONDON</i>
BENEFINK & Co.	242 London Rd., Croyd'n	<i>CRAFON, CROYDON</i>
BENHAM & FROUD, LD.	89 Cheapside, E.C.	<i>BENEFINK, LONDON</i>
	40 Chandos Street, W.C.	<i>BENFRO, LONDON</i>

1264 POSTAL AND TELEGRAPHIC ADDRESSES.—*Continued.*

NAME.	ADDRESS.	TELEGRAPHIC ADDRESS.
BIRD, GRAYSTONE	38 Milsom Street, Bath	BIRD, PHOTO, BATH
BIRMINGHAM CARBONIC ACID Co., THE (Brin's Oxygen Co., LTD.)	Saltley, Birmingham	BARYTA, BIRMINGHAM
BIRMINGHAM COLLODION PLATE Co.	Yardley, Birmingham	COLLODION, SOUTH YARDLEY
BIRMINGHAM OXYGEN Co., LTD.	Saltley Works, Birmingham	BARYTA, BIRMINGHAM
BIRMINGHAM PHOTOGRAPHIC Co., LTD.	Criterion Works, Stechford, nr. Birmingham	CRITERION, STECHFORD
BOAKE, A., ROBERTS, & Co., LTD.	Carpenter's Road, Stratford, E.	BOAKE, LONDON
BOEHM, FREDK.	16 Jewry St., Ald. ate	BISSULA, LONDON
BOLAS, S. B. & Co.	68 Oxford Street, W.	BOLASTYPE, LONDON
BOLTON & SONS.	47 West Nile Street	GRESHAM, GLASGOW
BOOTH BROTHERS.	63 Upper Stephen St.	BOOTH BROS., DUBLIN
BORLAND, F. J.	Sheepscar Grove, Leeds	BORLAND, LEEDS
BOWEN & Co.	6 Mount Pleasant, W.C.	BOWENITE, LONDON
BRAMWELL, E. & SON.	Navigation Chem. Wks, St. Helen's, Lancs.	BRAMWELL, ST. HELENS
BRIDGE, F. A.	55 Dalston Lane, N.E.	BRIDGE, DALSTON, L'DN
BRIGHTON PHOTO Co.	57 & 58 Clarence Sqre.	ENLARGEMENTS, BRITON
BRIN'S OXYGEN Co., LTD.	34 Victoria Street, Westminster, S.W.	BRIN'S OXYGEN, LONDON
BRITISH JOURNAL OF PHOTOGRAPHY.	24 Wellington Street Strand, London	PHOTOMETER, LONDON
BROOKS-WATSON DAY- LIGHT CAMERA Co. LTD., THE	Abercrombie Works, Great Homer Street, Liverpool	FILMS, LIVERPOOL
BROOKS, W.	Laurel Villa, Wray Park, Reigate	BROOKS, REIGATE
✓ BROWN, SCOTT, & Co.	254 High Holborn, W.C.	PUNCTUAL, LONDON
✓ BROWN, THEODORE	34A Castle Street, Salisbury	THEODORE BROWN, SALISBURY
BRUCE, T. S.	4 Villas-on-Heath, The Vale, Hampstead	BRUCE, VILLAS-ON- HEATH, HAMPSTEAD
BULLEN, H. E.	17 Thorncombe Road, East Dulwich, S.E.	TAURINUM, LONDON
BURROUGHS, WELL- COME & Co.	Snow Hill Buildings, London, E.C.	TABLOID, LONDON
BURROWS, T. H.	224 Stretford Road, Manchester	MICROSCOPE, MANCHESTER
BUSCH CAMERA Co.	31 Hatton Garden, E.C.	PURELLO, LONDON
BUTCHER, W. & SONS	Camera House, St. Bride Street, E.C.	CAMEMORO, LONDON
BUTT, JOHN EDE & SONS	Glengall Road, Millwall, E.	BUTTUTI, LONDON
CADETT & NEALL, LTD.	Greville Works, Ashted, Surrey	CADETT, ASHSTEAD
CAMERA CLUB	26 Charing Cross Road	MONOCHROME, LONDON
CARBUTT, JOHN	Wayne Junction, Phila- delphia, U.S.A.	CARBUTT, PHILADELPHIA
CHAPMAN, J. T.	Albert Sq., Manchester	CAMERA, MANCHESTER
CHRISTIE, JAMES	129 West St., Sheffield	CHRISTIE, WEST STREET, SHEFFIELD

POSTAL AND TELEGRAPHIC ADDRESSES.—Continued. 1265

NAME.	ADDRESS.	TELEGRAPHIC ADDRESS.
CLARKSON, A. & CO.	28 Barlett's Buildings, Holborn Circus, E.C.	EQUATORIAL, LONDON
CLÉMENT & GILMER	140 Faubourg St. Martin, Paris. France	PROGRESS, PARIS
COLLINS, A. M. MANFG. Co.	220-40 Columbia Ave., Philadelphia, U.S.A.	
CONDENSED GAS CO.	63 Grosvenor Street, Manchester	NITROGEN, MANCHESTER
CORNTHWAITE, H.	Imperial Arcade, B'ham	CORNTHWAITE, BIRM'HM
COVENTRY, H.	19 Sweeting St. Liverpl	KENTLEDGE, LIVERPOOL
COWGILL, B.	Photo Chemist, Burnley	COWGILL, CHEMIST, B'N'Y
CRANE CHEMICAL CO.	22 Newhall Hill, Birmingham	CHEMICAL, BIRMINGHAM
THE FREDERICK CROSS & BEVAN	4 New Ct. Lincoln's Inn	PHLOEM, LONDON
CURTIS OPTICAL & PHOTO CO.	65 Dawson Street, Dublin	"CURTIS," DAWSON ST., DUBLIN
DALLMEYER, J. H., LTD.	25 Newman Street, Oxford Street, w.	DALLMEYER, LONDON
DE FAYE, F. G.	21 David Place, Jersey	DEFAYE, CHEMIST, JERSEY
DEWEY, ALFRED	Sidcup, Kent	DEWEY, SIDCUP
DODSWORTH, J. & B.	127 St. George Street, E.	DODSWORTH, LONDON
DONE, J., & Co.	Photographic Works, New Barnet, N.	DONE, NEW BARNET
EDWARDS, B. J. & Co., LTD.	Castle Bar Works, Ealing Dean, w.	EXCEL, LONDON
EDWARDS, AUSTIN	Photo Film Wks. War'k	FILMS, WARWICK
ELLIOTT & SONS, LTD.	Park Rd., Barnet, Herts	ELLIOTT, BARNET
ELLIOTT, C. E.	36 Jewin Street, E.C.	CORUNDUM, LONDON
ELLIS, ALFRED, & WALERY	51 Baker Street, W.	POSITIONS, LONDON
ENDOLITHIC MANFG. Co., LTD.	Pomona Buildings, 61½ Fore Street, E.C.	DENDRON, LONDON
EPSTEIN, J.	33 Broad St., Bristol	EPSTEIN, BROAD STREET, BRISTOL
ERDMANN & SCHANZ	116 Bedford Hill, Balham, S.W.	ERDMANN, 116, BEDFORD HILL, BALHAM
ERNST, CARL & Co.	Rungestr, 19, Berlin, S.O.	VISITCARDS, BERLIN
EUROPEAN BLAIR CAMERA Co., LTD.	The Mills, Foots Cray, Kent	BLAIR, FOOTS CRAY
EYRE & SPOTTISWOODE	Great New Street, Fetter Lane, E.C.	SPOTLESS, LONDON
FALLOWFIELD, J.	Downs Park Road, Hackney, N.E.	PRINT EYRE, LONDON
FILMAX CAMERA MANFG. Co.	146, Charing Cross Road, w.	FALLOWFIELD, LONDON
FITCH & Co.	10, Victoria Street, Bristol	KINGHAM, BRISTOL
FLINSCH, FERDINAND	Seldon House, Fulwood's Rents, Holborn.	DISCURE, LONDON
FORREST, J. A., Co.	Offenbach a/m Germany	FLINSCH, OFFENBACH- MAIN
FORREST, THOS. & SONS	3 & 5 Brownlow Hill, Liverpool	LIGHTHOUSE, LIVERPOOL
FRASER & ELRICK	14, Market Street, Pontypridd	FORREST PHOTO., PONTYPRIDD
	57 Hanover St. Edinboro	PHOTOGRAPH, EDINBORO'

1266 POSTAL AND TELEGRAPHIC ADDRESSES.—*Continued.*

NAME.	ADDRESS.	TELEGRAPHIC ADDRESS.
FROST & REED FRY, S. H.	8 Clare Street, Bristol 12 South Villas, Cam den Square, N.W.	FROST AND REED, BRISTOL FRISIAN, LONDON
FUERST BROS. G AUMONT, L. & Co.	17 Philpot Lane, E.C. 22 & 25 Cecil Court, Charing Cross Road.	FUERST, LONDON OBJECISTI, LONDON
"GEM" DRY PLATE Co., LTD. GENNERT, G.	92A Villiers Road, Willesden Green, N.W. 24 & 26 East 13th Street, New York	CHEMITYPE, LONDON GENNERT, NEW YORK
GOERZ, C. P. GOTZ, J. R. GREENWOOD, H., & Co.	1-6 Holborn Circus, E.C. 215 Shaftesbury Avenue 24 Wellington Street, Strand, London	PHOTOPSIA, LONDON CYANOTYPE, LONDON PHOTOMETER, LONDON
GRIFFIN, JOHN J., & SONS, LTD. GRIFFITHS CAMERA Co., LTD., THE GUITERMAN, S., & Co., LTD. GWYNNE & Co.	20-26 Sardinia Street, Lincoln's Inn Fields. Highgate Square, Mose- ley Rd., Birmingham 35 & 36 Aldermanbury, E.C. Brooke Street Works, Holborn, E.C. 71 East Street, Brighton	GRAMME, LONDON GRIFFITHS, HIGHGATE, BIRMINGHAM BIDENTAL, LONDON GWYNNEGRAM, LONDON
H ARDCASTLE & Co.	4 Oliver's Yard, City Rd. 144 & 146 Edmund St. Imperial Studios, Brockley, S.E.	HARDCASTLE, EAST ST., BRIGHTON SICCATIVE, LONDON SCIENCE, BIRMINGHAM HEMERY, BROCKLEY, LONDON
HARRINGTON BROS. HARRIS, P., & Co., LTD. HEMERY, LINDSAY & Co. HICKS, J. J. HIGGINS, C. M., & Co. HINTON & Co. HOCKETT & WHITE HOLMES BROS.	8-10 Hatton Garden, E.C. 106 Charing Cross Road 38 Bedford Street, W.C. Potter's Rd., New Barnet 22 Oxford Street, Manchester	LENTICULAR, LONDON PLICATED, LONDON SENSITIZE, LONDON HOCKETT, NEW BARNET UNIQUE, MANCHESTER
HOOD & Co., LTD. HOPKIN & WILLIAMS	St. Bride Works, Middlesbrough 16 Cross Street, Hatton Garden, E.C.	HOOD, ENGRAVERS, MIDDLESBROUGH CERUM, LONDON
HORA, TUDOR, T. & Co. HOUGHTON, G., & SON HOWARD & JONES	346 York Road, Wandsworth, S.W. 89 High Holborn, W.C. 62 Strode Rd, Willesden Green, N.W.	HORA, WANDSWORTH, LONDON BROMIDE, LONDON PLATEFULS, LONDON
HOWES, R. W. HUGHES, H., & SON HUGHES, W. C.	Cumberland Works, Kew, S.W. 59 Fenchurch St., E.C. 82 Mortimer Rd., Kings- land, London, N.	R. W. HOWES, KEW GARDENS AZIMUTH, LONDON PAMPHENGOS, LONDON
HÜLSEN, JULIUS, & Co. HUME, W. HUNTER & Co.	28 Sandhill, Newcastle- on-Tyne 1 Lothian St., Edinburgh Eastdown Works, Lewisham, S.E.	HULSEN, NEWCASTLE-ON-TYNE HUME, EDINBURGH HUNTER, LEWISHAM, LONDON
HURMAN, LTD.	2 St. Nicholas Buildings 28 & 30 Constitutional Hill, Birmingham	HURMAN, NEWCASTLE-ON-TYNE POP, BIRMINGHAM

NAME.	ADDRESS.	TELEGRAPHIC ADDRESS.
HURST, A., & Co. HUSBANDS, H., & SONS	53 Leadenhall Street 8 St. Augustine's Parade, Bristol	VIVIFICO, LONDON HUSBANDS, OPTICIANS, BRISTOL
HÜTTIG, R., & SON	76 Schandauer Street, Dresden, Germany	CAMERA, DRESDEN
ILFORD, LTD.	Ilford, London	PLATES, ILFORD
ILLINGWORTH, THOS., & Co., LTD.	The Photo Works, Willesden Junction.	SQUEEGEE, LONDON
✓ IMPERIAL DRY PLATE Co., LTD.	Ashford Road, Crickle- wood, N.W.	IMPERIAL CO., CRICKLEWOOD
JOHNSON, MATTHEY, & Co., LTD.	75 Hatton Garden, E.C.	MATTHEY, LONDON
JOHNSON & SONS, LTD.	23 Cross St., Finsbury	CAUSTIC, LONDON
JOHNSON'S SACCHARUM Co., LTD.	Carpenter's Road, Strat- ford, E.	SACCHARUM, LONDON
KEENE, RICHARD, LTD.	Iron Gate, Derby	KEENE, PHOTO- GRAPHERS, DERBY
KENT, G. B., & SONS, LTD.	75 Farringdon Rd., E.C.	TRICHO, LONDON
KING, W., & Co.	Southsea Rd., Kingston- on-Thames	KING, SOUTHSEA ROAD, KINGSTON
KODAK, LIMITED	43 Clerkenwell Rd., E.C.	KODAK, LONDON
	Wealdstone, Harrow	KODAK, HARROW
	96 Bold St., Liverpool	KODAK, LIVERPOOL
	72 and 74 Buchanan Street, Glasgow	KODAK, GLASGOW
	4 Place Vendome, Paris	KODAK, PARIS
	36 Rue du Fossé aux Loups, Brussels	KODAK, BRUSSELS
	Bolschaja Konjuschen- naja 1, St. Petersburg	KODAK, ST. PETERSBURG
	I. Graben 29, Vienna	KODAK, VIENNA
	16 & 191 Friedrich- strasse, Berlin	KODAK, BERLIN
	Petrovka, Dom Michal- koff, Moscow	KODAK, MOSCOW
KÖNIG, OTTO, & Co. KRAUSS, E. KÜNTZEN, H., & Co.	10 Via Vittore Pisani, Milan	KODAK, MILAN
	27 Cross St., Finsbury	GINOK, LONDON
	21 & 23 Rue Albouy, Paris	LILLIPUT, PARIS
LANCASTER J., & SON	92-96 Bishopsgate St. Without, E.C.	GAMBADOES, LONDON
	Colmore Row, Birming- ham	LANKSTER, BIRMINGHAM
	97 Hatton Garden, E.C.	LEVIATHAN, LONDON
LEVI, JOSEPH, & Co. LEVI, JONES, & Co. LTD.	29 Hoxton Square, Old Street, N.	MINERALIZE, LONDON
LIZARS, J.	8 Wellington Place	LIZARS, OPTICIAN, BELFAST
	101 Buchanan Street	LIZARS, GLASGOW
	20 High Holborn, W.C.	CAMERATED, LONDON
	13 & 19 Shandwick Pl.	OPTICAL, EDINBURGH
LLOYD, F. V. A.	171 Union St. Aberdeen	LIZARS, OPTICIAN, ABERDEEN
	15 Lord St. Liverpool	PHOTOGENE, LIVERPOOL

NAME.	ADDRESS.	TELEGRAPHIC ADDRESS.
LONDON & PARIS OPTIC & CLOCK CO.	130 Clerkenwell Road, E.C.	LUNETTIER, LONDON
LONDON STEREO- SCOPIC CO., LTD. }	106 & 108 Regent St., W.	AMPHO, LONDON
LOW (SAMPSON), MAR- STON, & CO., LTD.	54 Cheapside, E.C.	STEREOSCOPIC, LONDON
LUCAS, JOSEPH, LTD.	St. Dunstan's House, Fetter Lane, E.C.	RIVSAM, LONDON
LUMIÈRE, A., & SES FILS	Great King Street	LUCAS, BIRMINGHAM
LUMIÈRE, N. A., CO. LTD.	Rue St. Victor, Mon- plaisir-Lyon, France	LUMIERE, LYON
LUXIA CO., THE	4 Bloomsbury St., W.C.	DIAMIDO, LONDON
MACKENZIE & CO.	South Hill Works, Hampstead, N.W.	COLLODION, LONDON
MALLANDAIN, ALBT. E.	17 Douglas Street, Glasgow	DAYLIGHT, GLASGOW
MANCHESTER OXYGEN CO., LTD.	51 Cheapside, E.C.	MALLANDAIN, LONDON
MARION & CO., LTD.	Great Marlborough St., Oxford Road	OXYGEN, MANCHESTER
MARTIN, J., & CO.	22 & 23 Soho Square, W.	NOIRAM, LONDON
MASON, R. G.	General Photo Works. New Southgate, N.	MARTIN, PHOTO, NEW SOUTHGATE
	69, Clapham Park Road	MASON, OPTICIAN, CLAPHAM
MAWSON & SWAN }	33 Soho Square, W.	FOCUSSING, LONDON
MCGHIE, J., & CO.	13 Mosley St. New- castle-on-Tyne	MANDS, NEWCASTLE-ON-TYNE
MEISENBACH CO., LTD.	75 St. Vincent Street	SOLAR, GLASGOW
	Wolffington Road, West Norwood, S.E.	MEISENBACH, LONDON
MEZZOTINT ENLARG- ING CO., THE	Grosvenor Road, Man- ningham, Bradford.	MEZZOTINT, BRADFORD
MONNICKENDAM, A.	43 Sandgate St. Ayr, N.B.	MONNICKENDAM, AYR
MOORES, DE SAULLES, & CO.	Wordsley, near Stour- bridge	MOORES, DE SAULLES, STOURBRIDGE
MORGAN, G. & W.	393 Union Street, Aberdeen	MORGAN, PHOTO- GRAPHERS, ABERDEEN
MORGAN & KIDD	Kew Foot Road, S.W.	ARGENTIC, RICHMOND, SURREY
MORISON BROTHERS	52 Renfield Street	DRAWING, GLASGOW
MORLEY & COOPER	271 Upper Street, N.	NEWEST, LONDON
MOSS, R. J., & SONS	98 Snow Hill, Birm'ham	ACETYLENE, BIRMINGHAM
MUDFORD, F. J.	Jackson Rd., Holloway	MUDFORD, ELECTRICIAN, HOLLOWAY
MÜLLER, A. E.	9 Fenchurch St., E.C.	PROBATUM, LONDON
MULTISCOPE AND FILM CO., THE	Burlington, Wis., U.S.A.	AL VISTA, BURLINGTON
MUSWELL GENERAL PHOTOGRAPHIC CO.	68 High Holborn, W.C.	CALIBRATE, LONDON
MYERS & FROST	42 Oxford Street, Manchester	ENLARGING, MANCH'ST'R
NEGRETTI & ZAMBRA	38 Holborn Viaduct, E.C.	NEGRETTI, LONDON
NELSON, DALE, & CO. }	14 Dowgate Hill, E.C.	DALESON, LONDON
LTD.	Emscote Mills, Warwick	OPAQUE, WARWICK
NEWMAN & GUARDIA, LTD.	90 and 92 Shaftesbury Avenue, W.	GONIOMETER, LONDON
NOAKES & NORMAN	23 Nelson St. Greenwich	NOAKES, GREENWICH

NAME.	ADDRESS.	TELEGRAPHIC ADDRESS.
O BORNE, EDWIN, & Co.	26 Red Lion Square, W.C.	ENROBO, LONDON
OZOTYPE Co., THE	1 Weedington Rd., N.W.	OZONICO, LONDON
P PAGET PRIZE PLATE Co., LTD.	Watford, Herts	PAGET, WATFORD
PALMER, W. E., & SONS	Leicester Road, New Barnet, Herts	CARBON, NEW BARNET
PARK, HENRY	5 Station Bldgs., Acton Street, Kingsland Rd.	PERNICITY, LONDON
PAUL, R. W.	68 High Holborn, W.C.	CALIBRATE, LONDON
PECK, EDWARD	East Dereham, Norfolk	PECK, EAST DEREHAM
PENROSE, A. W., & Co.	109 Farringdon Rd., E.C.	ZINCOGRAPH, LONDON
PERKEN, SON, & Co., LTD.	99 Hatton Garden, London, E.C.	OPTIMUS, LONDON
PEXTON, CHATHAM	368 Gray's Inn Rd., W.C.	DISSOLVING, LONDON
P PHOTOCHROM Co., LTD.	121 Cheapside, E.C.	PHOTOCHROM, LONDON
PHOTOGRAPHIC APPARATUS M'F'G. Co.	Dresden, Schanduerstr. 76	CAMERA, DRESDEN
P PHOTOGRAPHIC ART DEVELOPMENT Co., LTD., THE	Parchmore Rd., Thornton Heath, Surrey	PAD, THORNTON HEATH
PIGGOTT, JOHN	117 Cheapside, E.C.	JOHN PIGGOTT, LONDON
PLATINOTYPE Co., THE	22 Bloomsbury St., W.C.	PLATINOTYPE, LONDON
P POLYTECHNIC SCHOOL OF PHOTOGRAPHY	309, 311 Regent St., W.	POLYTECHNIC, LONDON
PONDERS & BAKER, LTD.	94 Clerkenwell Road	CASSEROLE, LONDON
P POSTAL TUBE Co.	70 Long Lane, Bermondsey, S.E.	PETER TYRER, LONDON
POTHS, H. & Co.	4 to 6 Bury Court, St. Mary Axe, E.C.	POTHS, LONDON
PRAGER & LOJDA	Hagelsberger-Strasse 53-54, Berlin	BILDKARTEN, BERLIN
PRESTON, JOB	56 Fargate, Sheffield	PRESTON, CHEMIST, SHEFFIELD
PRESTWICH MANUFACTURING Co., THE	1 Lansdown Road, Tottenham, N.	PRESTWICH, TOTTENHAM, LONDON
PRINGLE, R., & SONS	40 Clerkenwell Rd., E.C.	WILDERNESS, LONDON
PURSER, HY. F.	31 Hatton Garden, E.C.	PURELLO, LONDON
R RAE BROS.	134 St. Vincent Street, Glasgow	BOUDOIR, GLASGOW
RAINES, A., & Co.	St. Mary's Rd., Ealing	RAINES, EALING
REDFERN, H. JASPER	55 Surrey Street	JASPER REDFERN, SHEFFIELD
REDSHAW, W. H.	Bourne, Lincolnshire	REDSHAW, BOURNE
REYNOLDS & BRANSON, LTD.	14 Commercial Street	REYNOLDS, LEEDS
RICHFORD, E. M.	8 and 9 Snow Hill, E.C.	STAMPERIES, LONDON
RILEY BROTHERS, Ltd.	55 and 57 Godwin St.	LANTERNS, BRADFORD
ROCHESTER OPTICAL & CAMERA Co., THE	112 and 113 Fore Street, E.C.	OPTELLING, LONDON
ROSS, LTD.	111 New Bond Street, W.	ROSSANO, LONDON
	31 Cockspur Street, S.W.	ANASTIGMAT, LONDON
	Optical Works, Clapham Common, S.W.	ROSSICASTE, LONDON
ROTARY PHOTOGRAPHIC Co., LTD., THE	14 New Union Street, Moorfields, E.C.	ROTATORIA, LONDON

1270 POSTAL AND TELEGRAPHIC ADDRESSES.—*Continued.*

NAME.	ADDRESS.	TELEGRAPHIC ADDRESS.
ROUCH, W. W., & Co.	161 Strand, W.C.	PYROXYLINE, LONDON
ROWLEY, C., & Co., LTD.	Luna Street, New Cross	ORMOLU, MANCHESTER
RUDOWSKY, C. A.	22 Coleman Street, E.C.	RUDOWSKY, LONDON
SANDELL FILMS AND PLATES, LTD.	Norwood Junction, S.E.	STEREOGRAM, LONDON
SANDS, HUNTER & Co.	20 Cranbourn Street, Leicester Square, W.C.	SANDS, 20 CRANBOURN STREET, LONDON
SCHOELLER, FELIX, JUN.	Burg Gretesch, near Osnabrück	SCHOELLER, LUSTRINGEN GERMANY
SCHÖLZIG, OSCAR	Dashwood House, 9 New Broad St., E.C.	SCHOLZIG, LONDON
SCHÖLZIG, OTTO	31 Binfield Road, Clapham, S.W.	OBTESTOR, LONDON
SCORY, J.	4 and 6 Rue de Chateau London, Paris.	SCORY, PARIS
SCOTCH AND IRISH OXYGEN CO., LTD.	Hamilton Street, Pol- madie, Glasgow	OXYGEN, GLASGOW
SCOVILL & ADAMS Co., THE	3 and 5 West 19th St., New York	CHEMISTRY, NEW YORK
SEABROOK BROS. & Co.	21 Edmund Place, E.C.	PALPANDUM, LONDON
SEAVEY, L. W.	Walton Ave., New York	NARRATION, NEW YORK
SHARP & HITCHMOUGH	101 & 103 Dale Street, Liverpool	APTUS-FINDER, LIVERPOOL
SHARPLES, G.	7 Fishergate, Preston	SHARPLES, CHEMIST, PRESTON
SHEPHERD (SANGER) & Co.	5-7 Gray's Inn Passage, Red Lion St., Holborn	SENTIDO, LONDON
SHEW, J. F., & Co.	88 Newman Street, W.	DEVELOPER, LONDON
SICHEL, O., & Co.	52 Bunhill Row, E.C.	FRAMEWORK, LONDON
SLATER, WILLIAM F.	5 Fins Parade, High Road, Lee, S.E.	MOUNTINGS, LONDON
✓ SMEDLEY & Co.	22 Fleming Sq., Blackb'n	SMEDLEYS, BLACKBURN
SMITH, A. & J.	23-25 St. Nicholas St.	SMITH, OPTICIANS, ABERDEEN
SMITH, DR. J. H., & Co.	Wollishofen, Zurich	DRYPLATE, ZURICH
SMITH, W. A. C.	51 & 53 Dundas Street, Glasgow.	SMITH, OPTICIAN, GLASGOW
SMYTH, VICTOR E.	8 D'Olier St., Dublin	CAMERA, DUBLIN
SOUTHALL BROS., & BARCLAY, LTD.	1 Broad Street, Birmingham	SOUTHALL, BIRMINGHAM
SPENCER, JOHN	121 West George Street	SPENCER, GLASGOW
SPRATT BROS.	Tudor Road, Hackney	RHAMNUS, LONDON
STALEY, A. E. & Co.	35 Aldermanbury, E.C.	OPSIOMETER, LONDON
STEVENS, J. C.	38 King Street, Covent Garden, London	AUKS, LONDON
STEWARD, J. H.	406 Strand, W.C.	TELEMETER, LONDON
STILL, W. M., & Co.	24 Charles Street, Hatton Garden, E.C.	METAL SPINNER, LONDON
STOKES & WATSON	6 Market St. Manch'ter	SPECTACLES, MANCH'S'TR
STRANGEWAYS & SONS	Tower St., Cambridge Circus, W.C.	STRANGEWAYS, TOWER STREET, W.C.
SUTER, E.	16 Byfangstrasse, Basle	SUTERO, BASLE
SWAN ELECTRIC ENGRAVING CO.	116 Charing Cross Rd., London, W.C.	SOLARIZATION, LONDON
✓ SWIFT, J., & SON	81 Tottenham Court Road, London, W.	PRISMS, LONDON

NAME.	ADDRESS.	TELEGRAPHIC ADDRESS.
✓ T ABER BAS - RELIEF PHOTOGRAPHIC CO., THE	115 Newgate St., E.C.	TABERNILLA, LONDON
TALBOT, ROMAIN	Kaiser Wilhelm Strasse 46, Berlin	PHOTOMETER, BERLIN
✓ TALBOT & EAMER	Miral Works, Seel-St., Liverpool	MIRAL, LIVERPOOL
TAYLOR, BOXALL & CO.	98 Lewin Rd., Streatham, S.W.	VIGNAZZO, LONDON
TAYLOR, TAYLOR, & HOBSON, LTD.	Stoughton St. Works, Leicester	LENSES, LEICESTER
	18 Berners Street, W.	ILLIQUO LONDON
	St. James' Building, 1135 Broadway, New York, U.S.A.	LENSES, NEW YORK
TAYLOR, TUNNICLIFF, & CO. (1900) LTD.	Eastwood, Hanley, Staffs.	EASTWOOD, HANLEY
TECHNICAL CO., THE	22 Congress Street, Boston, U.S.A.	PAPILIO, BOSTON
✓ TELLACAMERA CO., THE	110 Shaftesbury Av., W.	TELLURATO, LONDON
TERRY, C. A., & CO.	92 Park Road North, Acton, W.	TERRIVOME, LONDON
THOMAS, R. W., & CO., LTD.	Pall Mall Factory, Thornton Heath, S.E.	SPEED, THORNTON HEATH
THORN & HODDLE	135 Victoria Street, Westminster, S.W.	INCANTO, LONDON
ACETYLENE CO., LTD		
THORNTON - PICKARD	Altrincham, near Manchester	PICKARD, ALTRINCHAM
MANFG. CO., LTD.		
TONKS, LTD.	Moseley St., Birm'gh'm	BRASS, BIRMINGHAM
✓ TYLAR, WILLIAM	41 High Street, Aston, Birmingham	TYLAR, SIXWAYS, BIRMINGHAM
✓ TYLER, CHARLES, & ENGLAND BROS., LTD	79 Copenhagen Street, King's Cross, N.	ENGLAND, LONDON
✓ TYLER, WALTER, & CO.	48 Waterloo Road, S.E.	WALTER TYLER, LONDON
U NDERWOOD, E. & T.	130 & 132 Granville Street, Birmingham	UNDERWOOD, 130 GRANVILLE ST. BIRMINGHAM
UNITED STATES EXPRESS CO.	49 Broadway, New York, U.S.A.	USEXCO, NEW YORK
V ALENTINE & SONS, LTD.	152 Perth Road, Dundee	VALENTINE, DUNDEE
✓ VANGUARD MANUFACTURING CO.	Maidenhead	VANGUARD CO. MAIDENHEAD
✓ VÉREL, F. W., & CO.	Cathcart, near Glasgow	MATCHLESS, CATHCART
VOIGTLÄNDER & SOHN	92-96 Bishopsgate Street Without	GAMBADOES, LONDON
W ACHTL, BERNHARD	VII. Kirchbergasse 37, Wien, Austria	BERNHARD-WACHTL, VIENNA
✓ WALLIS BROS.	Stamford Road Works, Kettering	WALLIS, STAMFORD RD. WORKS, KETTERING
WALTON, E. C., & CO.	Muskham Works, Newark	WALTON, MUSKHAM, NEWARK
WARWICK DRY PLATE CO.	Warwick	SILVER, WARWICK

1272 POSTAL AND TELEGRAPHIC ADDRESSES.—*Continued.*

NAME.	ADDRESS.	TELEGRAPHIC ADDRESS.
WARWICK TRADING CO., LTD., THE	4 & 5 Warwick Court, High Holborn, W.C.	COUSINHOOD, LONDON
WATERLOW & SONS, LTD.	Clifton Street, Finsbury, E.C.	WATERLOWS, FINSBURY WORKS, LONDON
WATKINS METER CO.	Imperial Mills, Hereford	WATKINS, HEREFORD
WATSON, W., & SONS	313 High Holborn, W.C.	OPTICS, LONDON
WELLBY, D. & J., LTD.	16 Forest Rd. Edinboro'	CAMERA, EDINBURGH
WELLINGTON & WARD	20 Garrick Street, Covent Garden, W.C.	WELLEY, LONDON
WELLS & CO.	Elstree, Herts	WELLINGTON, BOREHAM WOOD
WHITE & LIMMER	Avenue Road, Southgate, N.	WELLS, PHOTO, SOUTHGATE
WHITE, OTIS, C.	18 Brook St., Ipswich	VERAGRAPH, IPSWICH
WHITELOW, E. T.	Worcester, Mass., U.S.A.	ADJUSTABLE, WORCESTER, U.S.A.
WIGGIN & SON	70 Deansgate, M'nc'h's't'r	ALLMANN, MANCHESTER
WILLIAMS, J. ARTHUR	St. Matthew's, Ipswich	WIGGIN, IPSWICH
WILLWAY, J. S., & SONS	92 Hatton Garden, E.C.	VOIDER, LONDON
WILSON, G. W. & Co.	Drawbridge, Bristol	WILLWAY, DRAWBRIDGE, BRISTOL
WILSON, BROS.	2 St. Swithin Street, Aberdeen	LANDSCAPE, ABERDEEN
WOODBURY P.P.P. Co.	Loch-Head H. use, Aberdeen	LANDSCAPE, ABERDEEN
WOOD, E. G.	6 Great New Street, E.C.	SPOTLESS, LONDON
WOOLLEY, J., SONS, & Co., LTD.	Downs Park Road, Hackney, N.E.	PRINTEYRE, LONDON
WRATTEN & WAIN-WRIGHT	1 and 2 Queen Street, Cheapside, E.C.	EUPHANERON, LONDON
WRAY, W.	Victoria Bridge, Manchester	PHARMACY, MANCHESTER
WRIGHT, J. W.	Croydon, Surrey	WRATTEN, CROYDON
WYLEYS, LTD.	North Hill, Highgate, N.	WRAY, HIGHGATE, LONDON
WYNDHAM & Co., LTD.	141 St. James's Street, Burnley	WRIGHT, CHEMIST, BURNLEY
YORK & SON	M'facturing Chemists	WYLEYS, COVENTRY
YOUNG, J.	Mill Hill Park, Acton, W.	WYNDHAM, ACTON, LONDON
ZEISS, CARL	67 Lancaster Road, Notting Hill, W.	VASSALAGE, LONDON
ZIMMERMANN, A. & M.	16 Gallowtree Gate, Leicester	YOUNG, ANALYST, LEICESTER
ZIMMERMANN, CHAS. & Co.	Optische Werkstätte, Jena, Germany	ZEISSWERK, JENA
	29 Margaret Street, Cavendish Square, W.	DIACTINIC, LONDON
	Sutherland House, Lloyd's Avenue, E.C.	ZIMMERMANN, LONDON
	9 and 10 St. Mary-at-Hill, E.C.	POISONABLE, LONDON

THE . .
"GEM" Dry Plate Co.

Limited,

Are Manufacturers of PHOTOGRAPHIC
PLATES and PAPERS of every description of
the Finest Quality, suitable for use at Home
or Abroad.



SPECIAL QUOTATIONS for Shippers.



Large Consumers requiring Plates and
Papers with their own Labels are invited
to apply for terms.



The MOST LIBERAL DISCOUNTS to the
Profession offered. Price Lists and Discounts
on application.

WILLESDEN GREEN,
. . LONDON, N.W.

CHRISTIE'S

Specialities.

**For Lantern Outfitters,
Opticians, and Photographic Dealers.**



9-FT. BAMBOO SCREEN STANDS, 16/6 and 21/6.

9-FT. EMPIRE SCREENS, 11/9.

SET OF BRASS FITTINGS FOR 9-FT. STAND, 7/0.

LANTERN TRIPODS, in Hardwood, 22/0.

LECTURER'S READING DESK AND TRIPOD, 11/0.

SLIDE BOXES, Felt Lined and Polished, 70 Slides, 5/3.

„ Hinged Fronts, Varnished, 100 Slides, 4/6.

„ Strong Transit, 80 Slides, 3/0.

„ Light Transit, 60 Slides, 2/2.

„ For 12 Slipping Slides, 2/6.

„ For 12 Chromotropes, 3/2.

All above Boxes fitted with Leather Strap Handles.

„ Superior Grooved, and Varnished, 50 Slides, 1/8.

„ „ „ „ 100 „ 3/0.

„ Light, for Storage, 1/0.

ARGUS PRINT & CARD CUTTERS, $\frac{1}{4}$ -plt. 4/6, $\frac{1}{2}$ -plt. 7/6.

SWIVEL TRIMMERS, for Circles or Ovals, 24/0 & 30/0 doz.

TRIMMING WHEELS, 6/0 to 18/0 per dozen.

TRIMMING KNIVES, 5/6 to 18/0 per dozen.

GLASS CUTTERS, 6/0, 8/0, 10/0 and 12/0 dozen.

STEEL PRINTING FRAME SPRINGS, $\frac{1}{4}$ -plt. 1/3,
 $\frac{1}{2}$ -plt. 1/6 dozen.

$\frac{1}{2}$ -PLT. CAMERA, with Turntable, superior quality, 40/0.

3-FOLD ASH TRIPOD, Sliding Leg, 8/6.

PHOTO DUPLICATOR, for Stamps and Midgets, 25/0.

Special Terms to Dealers. Price Lists Free from —

JAS. CHRISTIE, WEST STREET, SHEFFIELD.

129 & 131.

NEW LANTERN SLIDES.

HERRING AND MACKEREL FISHERY. LARGE CATCHES OF FISH.
 INTERESTING FISH MARKET SCENE.
 STUDIES OF FISHING BOATS. FISHERMEN.
 DEEP SEA TRAWLERS, &c., &c.
 Also NORFOLK BROADS, CHURCHES, LOCAL VIEWS,

BY

H. JENKINS, Photographer and View Publisher,
 PIER TERRACE, LOWESTOFT.

1/- each. List free.

E. Laver Aldham.

ENLARGEMENTS IN BROMIDE,

And Finishing in Black-and-White.

Price List on application. Artistic Backgrounds Introduced.

DEALER IN PHOTOGRAPHIC MATERIALS.

AYTHORPE RODING, DUNMOW (G.E.R.), ESSEX.



The "ADELPHI"

PATENT HAND CAMERAS

Still to the Front!

THE most practical magazine Hand Camera on the market, being the outcome of many years' experience of camera construction, no pains having been spared to make every detail perfect. They are unequalled in design, construction, and finish; made throughout in England of finest quality materials and best workmanship. Guaranteed to stand any climate. These Cameras are used by the majority of leading amateurs and professionals all over the world. The "ADELPHI" Cameras are now fitted with two "Brilliant View" Finders of a specially accurate pattern, and they can be supplied polished black, or covered in best morocco leather.

The prices of the "ADELPHI" Cameras range from £4 10s.
 upwards, according to the make of lens used.

T. MILLER & SON,

Patentees and Manufacturers,

27 & 29, BLACKFRIARS STREET, MANCHESTER.

**B. J. EDWARDS & CO., LIMITED,
PHOTOGRAPHIC DRY PLATE
AND FILM MANUFACTURERS,
CASTLEBAR WORKS, EALING
DEAN, LONDON, W.**

Telegrams: "EXCEL, LONDON."

Sole Manufacturers of

EDWARDS' ISO PLATES,

The Original, and still the Best.

EDWARDS' ORDINARY PLATES.

Both the above made in Three Rapidities, and unequalled for Keeping Quality and Climate Resistance; therefore the best for export.

$\frac{1}{4}$ -plate 1/-, $\frac{1}{2}$ -plate 2/3 per doz.

KRISTAL PLATES

For Lantern Slides by Contact. Gaslight Development, &c.

**EDWARDS' SPECIAL
TRANSPARENCY PLATES**

For Lantern Slides by Reduction in the Camera, &c.

EDWARDS' METAL DARK SLIDES, DEVELOPING TRAYS, COLOUR SCREENS, &c.

**EDWARDS' DEVELOPING, INTENSIFYING,
REDUCING SOLUTIONS, &c.**

Write for fuller particulars, Price List and terms, to above address.

BENEFINK

&
CO.

The Great City Depot

FOR

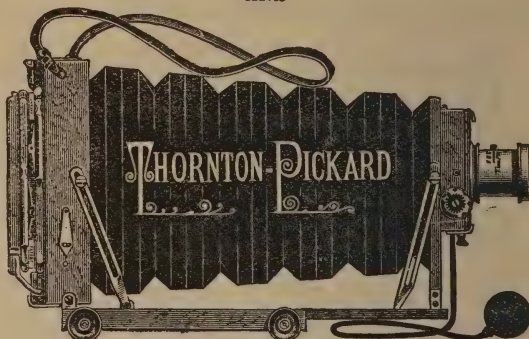
For Particulars see
following pages.

CATALOGUES
POST FREE.



AND

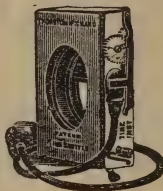
C
A
M
E
R
A
S



AND

S
H
U
T
T
E
R
S

CATALOGUES
POST FREE.



5% CASH
DISCOUNT.

CHEAPSIDE, LONDON, E.C.

See pages 475 to 485.

THORNTON-PICKARD

ABRIDGED CATALOGUE.

1903.



PHOTOGRAPHIC .
CAMERAS .
AND
SHUTTERS.



The Thornton-Pickard
Manufacturing Co. Ltd.
Altrincham. . . .

Terms of Business.

RETAIL ORDERS. A discount of 5 per cent. for cash with order will be allowed from the prices of all Goods of our manufacture, when the amount is not less than 10/- nett. It is respectfully requested that all orders be accompanied by remittance unless references have previously been given and an account opened.

REMITTANCES. Cheques or Post Office Orders to be made payable to the THORNTON-PICKARD MANUFACTURING Co. LIMITED, and may be crossed LLOYDS BANK LTD. P.O. Orders should be made payable at ALTRINCHAM. Postage Stamps may be used for the payment of small amounts. Foreign Orders are payable by P.O. Orders at ALTRINCHAM. or by Draft on a London or Manchester Bank.

ACCOUNTS. Monthly statements are rendered Nett, and are payable without any deduction on or before the 15th of the month following date of invoice.

ON APPROVAL. All Goods made by the THORNTON-PICKARD MANUFACTURING Co. LIMITED, may be obtained through any dealer in Photograph Apparatus, or they will be sent on approval if remittance for the amount accompanies order. The goods to be returned upon receipt if not approved.

CARRIAGE. Carriage paid on all prepaid retail orders within the British Isles, and on foreign prepaid retail orders to port of shipment. All small parcels are sent per parcel post, and larger ones by passenger train unless otherwise ordered. Wholesale orders are sent carriage forward.

PACKING. Experienced packers only are employed, and every care is taken to ensure safe transit. We do not therefore, hold ourselves responsible for any loss or damage, that may occur after the goods leave our premises. Packing boxes are charged at the lowest rate and are not returnable.

Index.

Page

1280 Terms.

SHUTTER.

1283 Time and Inst. Standard Pattern
 1283 " Aluminium "
 1283 " Behind Lens "
 1284 " Stereoscopic "
 1284 " " Behind Lens
 1284 Snap Shot Shutter [Pattern]
 1285 Studio "
 1285 Extra Rapid "
 1285 Foreground "
 1285 Special "
 1286 Focal Plane "
 1287 New Model Focal Plane Shutter
 1288 Iris Shutter
 1289 Self Capping Blind Shutters

ACCESSORIES.

1289 Time Exposure Valve
 1290 Shutter Releases.

CAMERAS.

1291 "Imperial" complete set

Page

CAMERAS.

1292 "Amber" Camera
 1293 "Tourist" "
 1294 "Ruby" "
 1295 "Royal Ruby" "
 1296 "Royal Ruby" Triple Extension

HAND CAMERAS.

1297 The "Oxford" Automan Camera
 1298 The "Roll Film" " "
 1299 The "Focal Plane" " "

ACCESSORIES.

1304 Stands
 1306 Plateholders
 1306 Film Carriers
 1305 Miscellaneous Sundries
 1300 Camera Cases
 1302 Lenses
 1307 Price List "Tourist" & "Amber" Outfits.
 1308 " " "Ruby" Outfits.
 1309 " " "Royal Ruby" Outfits.
 1310 " " Shutters.
 1312 " " Cameras.
 1314 Competition Rules.



Exposure 1/8th sec.

"POPPIES."

MISS AGNES TOMLINSON.

PRIZE PICTURE

Taken with a Thornton-Pickard "Amber" Camera, Lens and Studio Shutter.



(S. LIGUSTRI.)—PRIVET HAWK.



Exposure 3 minutes.
PRIZE PICTURES

(P. MACHAON.)—SWALLOW TAIL.

H. BEADNELL.

*Taken with a Thornton-Pickard "Ruby" Camera and Time
and Instantaneous Shutter.*

THORNTON-PICKARD

Time & Instantaneous Shutter.

with .

Speed Indicator.

This Shutter is the one recommended or general work. The Standard Pattern is constructed of mahogany and beautifully finished. It can be fitted either on the hood or tube of the lens.

The behind lens pattern is intended to be screwed to the Camera front, the lens being mounted on the Shutter panel.

Since its introduction this SHUTTER has won . .

Golden Opinions in all parts of the world

It has ably maintained its position as being the most reliable Shutter yet placed before the photographic public.



The **ONLY** Roller Blind SHUTTER capable of giving (with Time Exposure Valve) **SHORT "TIME" EXPOSURES** of $\frac{1}{8}$, $\frac{1}{4}$, $\frac{1}{2}$, and 1, 2, and 3 seconds.

INSTANTANEOUS EXPOSURES according to size of

Shutter, up to $\frac{1}{100}$ second.

PROLONGED TIME EXPOSURES of any duration.

EQUAL ILLUMINATION all over the Plate.

Absolutely without Vibration.

Particulars of Smallest Size:

SPEED, up to $\frac{1}{100}$ of a second.

DIMENSIONS, $3\frac{1}{4} \times 3 \times \frac{3}{8}$ inches.

WEIGHT, $3\frac{3}{4}$ OZS.

THE SPEED INDICATOR

is now fitted to all Thornton-Pickard Shutters without extra charge.



PRICES	SIZE, to fit on a Lens Hood or Tube up to inches diam.								
Speed Indicator included.	1½	1⅝	2	2½	3	3½	4	4½	5
Standard Pattern.....	14/6	15/-	16/-	18/-	21/-	25/-	30/-	35/-	38/-
Behind Lens.....	15/6	16/-	17/6	19/6	22/6	26/6	31/6	36/6	39/6
Aluminium Pattern.....	12/6	13/6	15/6	18/-	...	...	...	...	...
" Behind Lens ...	13/6	14/6	16/6	19/-	...	...	...	...	...

TIME EXPOSURE VALVE, 5/- EXTRA.

The Thornton-Pickard Shutters may be depended upon for uniformity of Exposure.

PATENT

Studio Shutter.

WORKS IN FRONT OF THE LENS OR INSIDE THE CAMERA

NO VIBRATION.

THIS Shutter is specially suitable or photographing children, animals, and all other subjects where silence in the working of the Shutter is a desideratum.

It is made on the roller blind principle and is constructed with two separate blinds which wind upon rollers at opposite ends of the box.

In their normal position the blinds cover the aperture and overlap each other.

On squeezing the pneumatic ball to make an exposure each blind instantly winds on to its roller, causing the shutter to open from the centre as shown partly accomplished in the illustration. On releasing the ball the blinds immediately close.

In this manner any exposures may be given from $\frac{1}{8}$ of a second to any longer period desired.

*Speed Indicator not required with Studio Shutter.



Extra Rapid Shutter.

Thornton. Pickard

Patent

(Time and Instantaneous).

A Shutter having two openings in the double blind, which cause it to open from and close to the centre. Speed one-half quicker than the Standard Pattern Time and Instantaneous Shutter.

Foreground Shutter

Thornton-Pickard

Patent

(Time and Instantaneous).

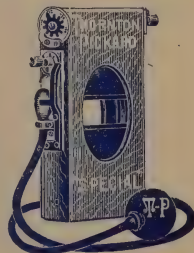
GIVES more exposure to the foreground than the sky. Specially suitable for cloud effects, landscapes, seascapes, and similar subjects. **NOTE.**—This Shutter is recommended on the Hood in preference to the Tube. Speed same as Standard Pattern Time and Instantaneous Shutter.

Special Shutter. Instantaneous only.

RECOMMENDED when the Focal Plane Shutter cannot be used and when a Shutter working at a higher speed than the ordinary Time & Instantaneous is required. This Shutter is fitted in front of the lens and works at a speed up to $\frac{1}{150}$ of a second.

PRICES. (including Speed Indicator).

To fit on a Lens, Hood or Tube up to ins. dia.	$\frac{1}{8}$	2	$2\frac{1}{2}$	3	$3\frac{1}{2}$	4	$4\frac{1}{2}$	5
Silent Studio Shutter	*	20/6	23/6	27/6	32/6	37/6	42/6	47/6
Extra Rapid Shutter		23/6	25/6	28/6	32/6	37/6	...	...
Foreground Shutter		23/6	25/6	28/6	32/6	37/6	...	...
Special Shutter		24/6	25/6	28/6	32/6	37/6	...	...



Entry Form and Prospectus for Prize Competition, post free.

PATENT

Focal Plane Shutter.

(Original Model).

The Focal Plane is the best type of Shutter for successfully Photographing

Flying Birds.

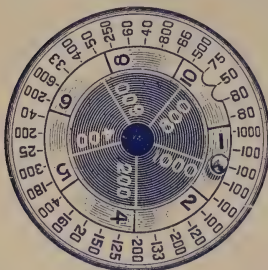
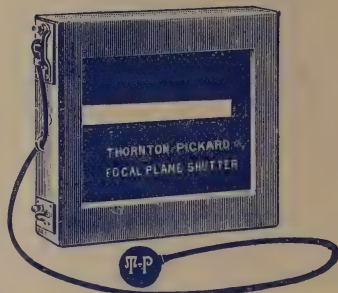
Animals in Motion,

Men Leaping, Jumping, and

All Rapidly Moving Objects.

The Focal Plane Shutter is easily fitted to the camera in the place of the reversing back. The slide or plateholder fits into the back of the shutter.

By means of an adjustable slit in the blind, exposures ranging from $\frac{1}{250}$ th of a second up to $\frac{1}{1000}$ th of a second can be given, thus making the shutter useful for comparatively long exposures, as well as the shortest of instantaneous exposures.



New

Patent Calculator,

3/6 each.

For long Time Exposures the shutter can be wound up to the top (as when focussing) and the cap or time shutter used in the usual manner without removing the focal plane shutter from the camera.

For descriptions of NEW MODEL with all adjustments from the outside, see next page.

NEW PATENT

SPEED CALCULATOR

Shows at a glance what speed is obtained by the variation of the Adjustable Slit and the Speed Indicator.

A real help to all Focal Plane Workers.

Can be adapted for use with all Focal Plane Shutters.

PRICES of FOCAL PLANE SHUTTERS.

(Original Model).

Size	Price	Size	Price	Size	Price
$4\frac{1}{4} \times 3\frac{1}{4}$...	£1 5 0	$6\frac{1}{2} \times 4\frac{1}{4}$...	£1 15 0	$8\frac{1}{2} \times 6\frac{1}{2}$...	£2 10 0
5×4 ...	1 10 0	7×5 ...	2 0 0	10×8 ...	3 0 0
$6\frac{1}{2} \times 4\frac{1}{4}$...	1 15 0	$7\frac{1}{2} \times 5$...	2 2 6	12×10 ...	4 10 0
$6\frac{3}{4} \times 3\frac{1}{4}$...	2 0 0	8×5 ...	2 7 6	15×12 ...	5 10 0

No extra charge is made for fitting to our own cameras, but when fitted to cameras of other makers a charge is made, varying from 2/6 to 10/- (according to the size of shutter and the amount of work involved).

Note—Reduced Prices of Focal Plane Shutters (original model).

NEW MODEL FOCAL PLANE SHUTTER.

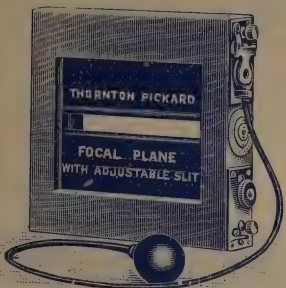
(PATENT)

**With all Adjustments
from the Outside.**

TESTIMONIAL.

"Kingstown, Co. Dublin, 27/3/02.

I am greatly pleased with the Focal Plane Shutter, and was soon able to grasp the explanations as to working. The speed regulator is wonderfully correct and satisfactory.—G. E."



SPECIAL ADVANTAGES.

Adjustable Slit Opened and Closed from Outside.

Outside Indicators Showing Width of Slit.

Speed Calculator Showing the Exact Speed.

WE have much pleasure in introducing this New Focal Plane Shutter, the more so seeing that the present popularity of high Speed Focal Plane Photography is largely due to the efforts we have made to popularise Instantaneous Photography.

Whilst the original model Shutter is perfect as regards efficiency of exposure, the new model is more convenient to manipulate.

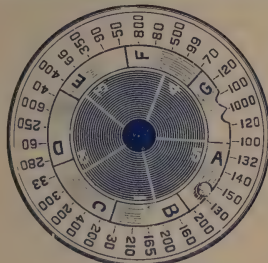
With this new pattern Shutter the slight difficulty experienced by beginners in altering the width of the slit in the blind has been entirely overcome.

All Operations are effected from the outside.

We are confident that photographers will be quick to appreciate these undoubted and obvious advantages.



[Side of Shutter showing Winding Knob Lever, Calculator, Slit Adjuster and Speed Knob]



Speed Calculator.

A range of speed from $\frac{1}{30}$ to $\frac{1}{1000}$ th of a second is obtained, and by means of an ingenious patented calculator the speed is easily ascertained.

If a certain speed is desired, the calculator shows at a glance what width of slit and what speed must be employed.

This Calculator is included in the price of the new model Focal Plane Shutter, but has been adapted also for use with the old pattern Shutter at a charge of 3/6.

Fitting. No extra charge is made for fitting Focal Plane Shutter to cameras of our own manufacture, but when fitted to cameras of other makers', a charge of from 2/6 to 10/- is made, according to the size of shutter, and the amount of work required.

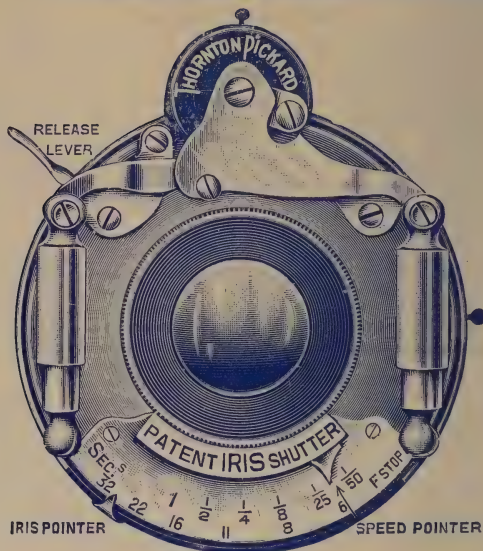
PRICES, NEW MODEL FOCAL PLANE SHUTTER,
Including Speed Indicator and Calculator.

$4\frac{1}{2} \times 3\frac{1}{4}$... £2 5 0	$6\frac{1}{2} \times 4\frac{1}{2}$... £2 15 0	$7\frac{1}{2} \times 5$... £3 6 0	$8\frac{1}{2} \times 6\frac{1}{2}$... £3 10 0	12×10 ... £3 5 0
5×4 ... 2 10 0	7×5 ... 3 6 0	8×5 ... 3 10 0	10×8 ... 4 4 0	15×12 ... 6 6 0

Thornton-Pickard Manufacturing Co. Ltd., Altrincham.

THE THORNTON-PICKARD NEW PATENT

IRIS SHUTTER.



A New between
lens Shutter
made entirely
of metal.

The block shows
the full size of
the Shutter.

Small, compact,
and efficient.

All moving parts
carefully ad-
justed and
accurately
balanced.

Works smoothly
without vi-
bration.

Speeds from $\frac{1}{50}$
of a second to
1 second.

Time Exposures
of any dura-
tion.

Pneumatic or
Lever release.

THE SHUTTER IS SET WITHOUT EXPOSING THE PLATE.

THE "IRIS" SHUTTER has been introduced to supply the needs of those users and makers of Hand Cameras who require a shutter small in bulk and accurate in working. Where it is not possible or is inconvenient to use a roller blind shutter the Iris Shutter is recommended, though the fact that the Thornton-Pickard roller blind shutter is the more efficient and correct, should not be lost sight of. The exposures given by the Iris Shutter are as near to the engraved speeds, as it is possible for skilled workmen to make them. The roller blind pattern, however, admits of far greater accuracy and precision, and is for that reason to be preferred whenever possible.

The 'Iris' Shutter is supplied with all Thornton-Pickard Lenses,
and to many other high-class lenses without
extra charge for fitting.

Thornton-Pickard Rapid Aplanat Lens, 5in. focus, full
aperture, f6.5, fitted with above "Iris" Shutter ...

50/-

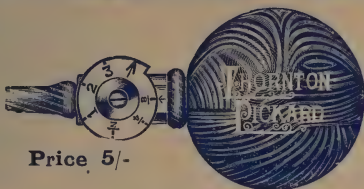
Iris Shutter only ...

25/-

Thornton-Pickard Manufacturing Co. Ltd., Altrincham.

Time Exposure Valve.

Can be supplied
with any
**Thornton-
Pickard . .
Time and
Instantaneous
Shutter.**



Price 5/-

Or supplied
complete with
**Arabesque
Ball, Tube, and
Teat, 6/9**

This is an extremely ingenious and at the same time simple invention, by which short "time" exposures of $\frac{1}{8}$, $\frac{1}{4}$, $\frac{1}{2}$, 1, 2, and 3 seconds can be given with absolute accuracy.

The above illustration shows the outside appearance of the invention. It will be noticed that a pneumatic ball is fitted on to an air escape valve at the other end of which a rubber tube is attached by means of a screw connection.

PRICE: fitted to any Thornton-Pickard Time and Instantaneous Shutter at time of ordering, or fitted afterwards to any Thornton-Pickard Time and Instantaneous Shutter sent to us for that purpose...		5/-
If New Ball, Tube and Teat required, 1/9 extra.		
If the Shutter cannot be sent to us for fitting, we can supply the Valve complete with Arabesque Ball, Tube, and Teat ...		6/9

PLEASE NOTE.—Valves alone cannot be supplied, owing to the fact that they must be accurately fitted to the ball and tube by experienced workmen only.

When Valves belonging to Customers are sent to be fitted to new Releases a charge of 1/- is made for fitting and testing.

PATENT

Self-Capping Blind.

FITTED TO

Covers the Lens
whilst setting
the Shutter.

TIME & INSTANTANEOUS

OR . .

SNAP SHOT SHUTTER.

The Cord runs back into the Shutter after setting.

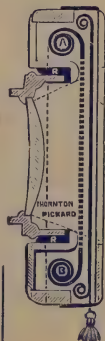
The following particulars relate to the Time and Instantaneous (standard pattern) when fitted with Self-Capping Blind.

Particulars of the smallest size Shutter fitted with Self-Capping Blind:

SPEED, up to $\frac{1}{50}$ of a second.

DIMENSIONS, $3\frac{1}{2} \times 3\frac{3}{8} \times \frac{5}{16}$.

WEIGHT, 6 oz.



Price of the Self-Capping Blind, from 5/- to 7/6 extra, with either Mahogany Time and Instantaneous or Snap Shot Shutters.

It is not intended to fit this attachment to the Aluminium Shutter.

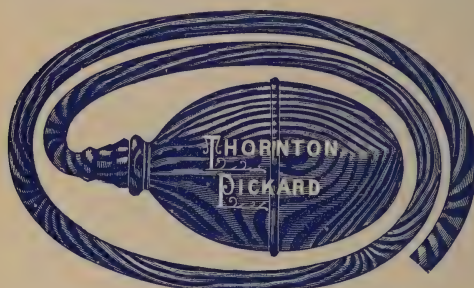
THORNTON-PICKARD SHUTTER RELEASES

"ARABESQUE." Best Quality.

The "Arabesque" Balls and Tubes supplied by us are all specially made for our Shutters from the best pure Para rubber, and are we believe, unequalled in quality and durability. We would caution purchasers to see that they obtain only those that are marked with the **THORNTON PICKARD** name which is moulded on the ball as shown in the illustration.



Standard
Pattern
Release.



No. 0 is the small ball for all ordinary T.P. Shutters.

No. 1 is the larger ball for the Studio Shutter.

No. 3 is a larger ball still, for use with lengths of tubing up to 30 ft. long.

No. 4 for Tubing up to 50 ft. long, and

No. 6 for Tubing up to 100 ft. long.

The "Iris" pattern is for the Thornton-Pickard Iris and other similar Shutters.

"Iris" Pattern Release.

The "Black" & "Red" Qualities

are recommended as being the best value obtainable at their respective prices

COMPLETE PRICE LIST.

DESCRIPTION.	Size.	PRICE.	Extra Teats each.	Extra Tubing per ft.
"Arabesque," Best Quality, including 2 ft. Tubing and Teat	No. 0	1/9	3d.	4d.
"Arabesque" with 2 ft. Tubing and Teat Studio	No. 1	3/-	1/-	4d.
" " Ball only For Tubing up to 30 ft.	No. 3	2/-	3d.	4d.
" " " " " " " 50 ft.	No. 4	4/-	3d.	4d.
" " " " " " " 100 ft.	No. 6	6/-	3d.	4d.
When Ordering these Balls please say length of Tubing required.				
"Iris" pattern, with 18 in. Tubing but no Teat	...	1/6	3d.	4d.
"Black" Ball, 2 ft. Tubing and Teat	No. 0	1/6	3d.	4d.
"Red" " " " " " " "	No. 0	1/3	3d.	3d.

Postage Extra. Postage on one Ball, Tube and Teat is 1d.

Screw Connections 3d. per pair (these can be used for joining two lengths of Tubing together.)

Studio Shutter Tap (to enable the photographer to keep the Shutter open any length of time without holding the ball), 1/- each.

NOTE.—When specially ordered we supply the long Tubing with a Screw connection, so that it may be attached to the short length already on the Shutter by simply unscrewing the small Ball. Thus, either the long or short lengths are readily interchangeable.

The No. 0, "Arabesque" "Black" and "Red" Balls and Tubes can be supplied without Teats, for Iris Shutters if required at 1/6, 1/3, and 1/1 respectively.

The THORNTON-PICKARD

"Imperial"**COMPLETE OUTFIT.****PRICE, Half-Plate Size - £4 : 4 : 0.**

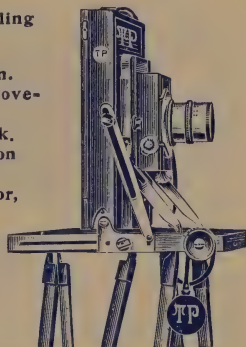
THIS outfit has been introduced to meet the requirements of those, who, whilst not desiring to go to the expense of the "Ruby" or "Amber" Cameras, still desire to have an instrument of really good construction and finish. The "Imperial" Camera has all the necessary movements including:—

Swing Back,
Rising and Falling
Front.

Swing Front.
Long Extension.
Short Focus Move-
ment.

Reversing Back,
Rack and Pinion
Turntable,
Plumb Indicator,
R.R. Lens,
with Iris
Diaphragm.

Three-Fold
Stand.
etc.



The "Imperial" Outfit is supplied complete and includes:— Camera with Turntable, Plateholder, Thornton-Pickard Time and Instantaneous Shutter with Speed Indicator Rapid Rectilinear Lens with Iris Diaphragm and Three-fold Tripod.

Half-Plate, complete	...	...	£4 : 4 : 0
13 x 18 c/m.	...	...	5 : 5 : 0
Whole Plate, complete	...	...	6 : 6 : 0

Thornton-Pickard Manufacturing Co. Ltd., Altrincham.

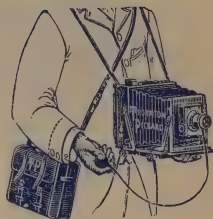
Telegraphic Address: "Pickard, Altrincham."

The "Amber" Camera

THORNTON-PICKARD PATENT.

THE "Amber" Camera possesses the same high-class quality of material and workmanship as the "Ruby," description of which is given on the following page.

The "Amber" however, is somewhat different in design, the principal difference being in the construction of the front, which being narrower than that of the "Ruby," is therefore not suitable for Stereoscopic photography.



Includes all Necessary Movements.

Swing Back.

Swinging Front giving both rise and fall.

Long and Short Extension.

Folding Front and Double Pinion.

Independent Rise to the Front.

Reversible Back.

Spring Focussing Screen.

Plumb Indicator.



The Spring Focussing Screen has been designed specially to meet the demand for a Stand Camera which will work equally well as a Hand Camera (see engraving). It guides the Plate Holders or slides into position.

When a Lens is supplied with the Camera, an Ivory Focussing Scale is attached to the baseboard without extra charge. When Customer's own Lens is fitted to the Camera, a small extra charge is made for engraving the Focussing Scale to suit the Lens.

COMPLETE OUTFITS.

"Amber" Outfit No. 2. (for Hand or Stand)	$4\frac{1}{4} \times 3\frac{1}{4}$	5×4 and 9×12 c/m	$6\frac{1}{2} \times 4\frac{3}{4}$	$7\frac{1}{2} \times 5$ and 13×18 c/m	$8\frac{1}{2} \times 6\frac{1}{2}$
Camera	2 13 6	3 2 6	3 8 6	4 5 0	4 18 6
Double Plate Holder	- 8 6	- 9 6	- 10 6	- 12 0	- 18 0
Turntable	- 17 6	- 17 6	1 0 0	1 5 0	1 5 0
Stand, Twofold	- 13 0	- 13 0	- 13 0	- 13 0	- 13 0
Time and Inst. Shutter with Speed Indicator and Time Exposure Valve, fitted to front of Camera	1 0 6	1 1 0	1 2 6	1 2 6	1 7 6
"Amber" R.R. Lens	1 7 6	1 7 6	1 12 0	2 15 0	2 15 0
Bright Finder	- 8 6	- 8 6	- 8 6	- 8 6	- 8 6
	7 9 0	7 19 6	8 15 0	11 1 0	12 2 6
Waterproof Case, pattern A.....	- 7 6	- 8 6	- 9 6	- 11 6	- 13 6

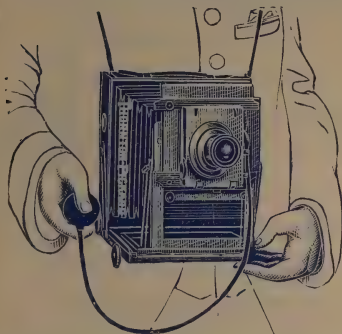
Thornton-Pickard Manufacturing Co. Ltd., Altrincham.

Entry Form and Prospectus for Prize Competition, post free.

The THORNTON-PICKARD

"TOURIST" CAMERA.

After being entirely
remodelled the
"TOURIST" CAMERA
is now
REINTRODUCED.

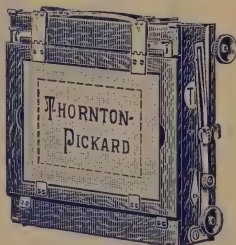


ITS old reputation or quality of material, workmanship and finish is maintained. It possesses all the movements that are expected in a modern high class Camera. The following may be specially mentioned.

UNIVERSAL FRONT. The front rises and falls parallel to the plate, but can when occasion demands, be disengaged and allowed to swing in any direction. This modification is effected by the use of the double struts which were fitted to and formed a useful feature of our original "Tourist" Camera which was placed on the market some years ago. These same struts also provide a means of extending the bellows nearly two inches further than usual.

CROSS FRONT. The panel carrying the shutter and lens is fitted in grooves, so that by a sliding motion the lens can be brought opposite any part of the plate.

SIDE SWING. The back of the Camera is so fitted that either side may be placed nearer the lens when required.



OTHER MOVEMENTS.

Swing Back.

Rising and Falling Front.

Long and Short Extension.

Reversing Back.

Rack and Pinion to

both Back and Front.

PRICE LIST.

"Tourist" Outfit No. 2 (for Hand or Stand)	4 $\frac{1}{4}$ × 3 $\frac{1}{4}$	5 × 4 and 9 × 12 c/m	6 $\frac{1}{2}$ × 4 $\frac{3}{4}$	7 $\frac{1}{2}$ × 5 and 13 × 18 c/m	8 $\frac{1}{2}$ × 6 $\frac{1}{2}$
Camera	3 10 0	4 0 0	4 10 0	5 0 0	6 0 0
Double Plate Holder	0 8 6	0 9 6	0 10 6	0 12 0	0 15 0
Turntable	0 17 6	0 17 6	1 0 0	1 5 0	1 8 0
Stand, Twofold	0 13 0	0 13 0	0 13 0	0 13 0	0 13 0
Time and Inst. Shutter with Speed Indicator and Time Exposure Valve, fitted to front of Camera	1 0 6	1 1 0	1 2 6	1 4 6	1 7 6
"Amber" R.R. Lens	1 7 6	1 7 6	1 12 0	2 15 0	2 15 0
Bright Finder	0 8 6	0 8 6	0 8 6	0 8 6	0 8 6
	8 5 6	8 17 0	9 16 6	11 18 0	13 4 0
Waterproof Case, pattern A ...	0 7 6	0 8 6	0 9 6	0 11 6	0 13 6

Either the "Ruby" or other makes of Lenses can be fitted if desired.

THE "Ruby" Camera

**THORNTON-
PICKARD
PATENT.**

It can be used as
A STAND CAMERA,
A HAND CAMERA, or
A STEREOSCOPIC CAMERA

The Shutter folds up into the Baseboard.

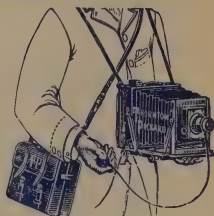
The Shutter is attached to and forms part of the Camera.

The front has a large amount of Rise and Fall.

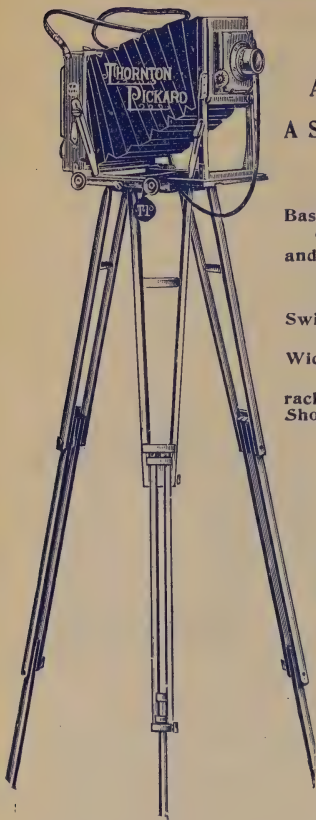
The Camera is fitted with Vertical and Horizontal Swings.

The Back may be pushed up to the front for use with Wide Angle Lenses.

The Camera has a Double Pinion, so that it may be racked from the longest to the shortest focus. Special Short Focus Movement.

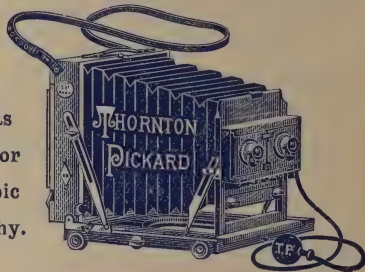


Arranged for use as a Hand Camera.



Showing the extent of Rising Front.

Camera as
arranged for
Stereoscopic
Photography.



PARTICULARS OF HALF-PLATE SIZE.

Size when folded, including Turntable, Shutter, and all projections.....9in. x 8½ x 3½in.
Longest Focus with Shutter attached... 16in.
Weight about 3½lbs.
Do. including Shutter about 3½lbs.

COMPLETE OUTFITS.

"RUBY" Outfit No. 1 (for Hand or Stand.)	Quarter-plate. 4½ x 3½	5 x 4 and 9 x 12 c/m	Half-plate. 6½ x 4½	7½ x 5 and 18 x 18 c/m	Whole-plate. 8½ x 6½	10 x 8
Camera, including Turntable and one Double Plate-Holder	5 6 0	5 9 6	6 8 0	7 7 0	8 17 6	10 1 0
Stand, three-fold, to fit Turntable..	17 6	17 6	17 6	17 6	17 6	1 2 6
Time and Inst. Shutter with speed Indicator, and Time Exposure Valve fitted to Camera front.....	1 0 6	1 1 0	1 2 6	1 2 6	1 4 6	1 7 6
"Ruby" R.R. Lens	2 10 0	2 10 0	3 0 0	4 0 0	4 10 0	6 5 0
Bright Finder.....	8 6	8 6	8 6	8 6	8 6	8 6
	10 2 6	10 6 6	11 16 6	13 15 6	15 18 0	19 4 6
Waterproof Case (Pattern C)	14 0	15 0	16 0	18 0	1 0 0	1 3 0

The "Royal Ruby" Thornton-Pickard Patent.

The Standard Pattern Ruby to which has been added every desirable movement making it **THE MOST PERFECT INSTRUMENT FOR ALL PHOTOGRAPHIC PURPOSES.**

The "Royal Ruby" has been designed to include all movements that the most exacting worker may require. In addition to the movements fitted to the standard "Ruby" camera, the "Royal Ruby" has the following which might be specially mentioned:—

Rising and Falling Front actuated by Rack and Pinion.

Cross Front actuated by Rack and Pinion.

Improved Side Swing.

Back Racking Forward, for Wide Angle Work.

Every Movement Adjusted by Mechanical Action.

For Architectural, Engineering, Technical, Landscape, Portrait, or Stereoscopic Photography.

Particulars of Half-Plate Size.

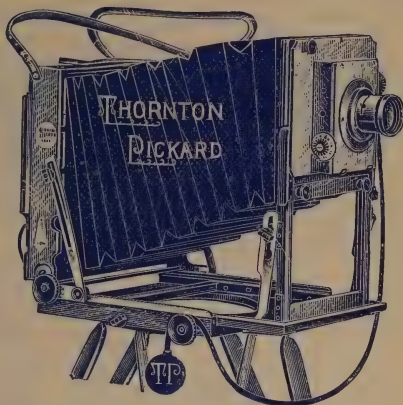
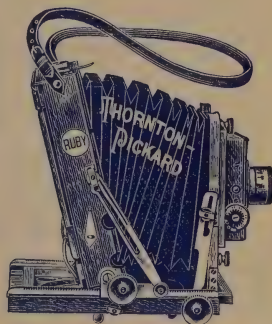


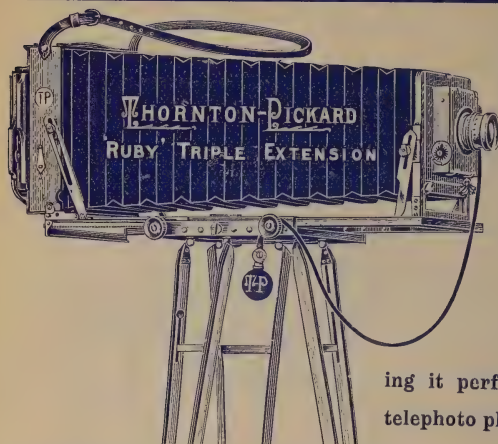
Illustration of Rising, Falling, and Cross Front.



SIZE.....	$4\frac{1}{2} \times 3\frac{1}{2}$	$\& 9 \times 12 \text{ c/m}$ 5×4	$6\frac{1}{2} \times 4\frac{1}{2}$	$8\frac{1}{2} \times 6\frac{1}{2}$
	£ s. d.	£ s. d.	£ s. d.	£ s. d.
"Royal Ruby" Camera, only	5 0 0	5 2 6	6 7 6	8 12 6
Turntable.....	0 17 6	0 17 6	1 0 0	1 8 0
Stand, Three-fold to fit Turntable...	0 17 6	0 17 6	0 17 6	0 17 6
Time and Instantaneous Shutter with Speed Indicator, & Time Exposure Valve fitted to Camera Front ...	1 0 6	1 1 0	1 2 6	1 4 6
Three-Plate Holders ...	1 5 6	1 8 6	1 11 6	2 8 0
"Ruby" R.R. Lens ...	2 10 0	2 10 0	3 0 0	4 10 0
Bright Finder... ..	0 8 6	0 8 6	0 8 6	0 8 6
	11 19 6	12 5 6	14 7 6	10 3 0
Waterproof Case, pattern C ...	0 14 0	0 15 0	0 16 0	1 0 0

THORNTON-PICKARD PATENT

"ROYAL RUBY" TRIPLE EXTENSION



CAMERA.

A superb instrument, having, besides the movement of the "Royal Ruby," an extra extension of bellows, making it perfect for copying or telephoto photography.

THIS Pattern has all the movements and Advantages of the "Royal Ruby" with the addition of increased Extension, which has been obtained with only a slight increase of the size of the Camera body, and without sacrificing the short extension which the "Ruby" has always given.

As will be seen from the illustration the extra extension is obtained by racking the bellows out at the back of the Camera. By this means the Camera is evenly balanced at the longest extension.

The extra rack and pinion movement is manipulated from the left side, and therefore does not interfere with the ordinary working of the Camera.

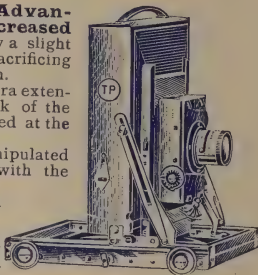
In all other respects the Camera is identical with the ordinary "Royal Ruby" pattern.

For Telephoto Work the Triple Extension "Royal Ruby" Camera is indispensable. The long extension allows the use of the long focus single combination of a double lens—a course often recommended, and just as often impracticable, on account of the short extension of bellows usually provided.

For Copying purposes the Triple Extension "Royal Ruby" is all that can be desired, and it can also be used as a Stereoscopic Camera when required.

Longest Extension, Half-Plate size, 22 inches, including Shutter.

Shortest

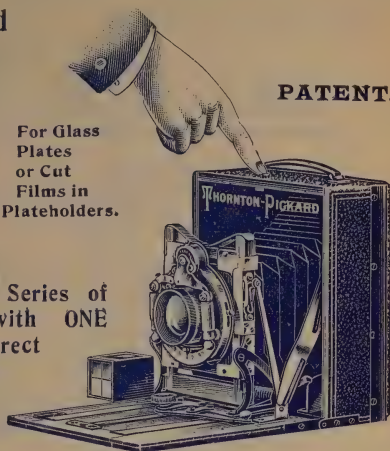


SIZE	$4\frac{1}{2} \times 3\frac{1}{4}$	5×4	$6\frac{1}{2} \times 4\frac{3}{4}$	$8\frac{1}{2} \times 6\frac{1}{2}$
	£ s. d.	£ s. d.	£ s. d.	£ s. d.
"Royal Ruby" Triple Extension Camera	7 0 0	7 5 0	7 10 0	9 15 0
Turntable	0 17 6	0 17 6	1 0 0	1 5 0
Stand, Three-fold to fit Turntable.....	0 17 6	0 17 6	0 17 6	0 17 6
Time and Instantaneous Shutter with Speed Indicator, and Time Exposure Valve fitted to Camera Front	1 0 6	1 1 0	1 2 6	1 4 6
Three Plate-Holders	1 5 6	1 8 6	1 11 6	2 5 0
"Ruby" R.R. Lens	2 10 0	2 10 0	3 0 0	4 10 0
Bright Finder	0 8 6	0 8 6	0 8 6	0 8 6
	13 19 6	14 8 0	15 10 0	20 5 6
Waterproof Case, pattern C.....	0 14 0	0 15 0	0 16 0	1 0

The Thornton-Pickard "OXFORD" AUTOMAN.

For Glass
Plates
or Cut
Films in
Plateholders.

PATENT.



The first of the Automan Series of Folding Cameras, which, with ONE TOUCH, open out to the correct fixed focus position, as shown in the illustration.

New and Novel Features are to be found in this series which are calculated to lessen the number of operations which hitherto have been necessary before folding Cameras can be brought into use.

The Self-Erecting Front is the Special Feature throughout the Automan Series.

The "Oxford" Automan Camera is constructed to take Plate Holders.

It is provided with spring ground glass focussing screen, which enables objects to be accurately focussed when the Camera is used on the tripod.

The front falls automatically into correct position.

When closed up the "Oxford" Automan Camera is remarkably small and compact and presents no projections.

A Thornton-Pickard Iris Shutter is fitted between the lens combinations, by means of which exposures, of $\frac{1}{10}$ th, $\frac{1}{25}$ th, $\frac{1}{50}$ th, $\frac{1}{100}$ th, $\frac{1}{200}$ th and 1 second may be given, and time exposures of any duration.

Plate Magazine or Roll Holder can be fitted.

SPECIFICATION.

The "Oxford" Automan Camera Set comprises Camera with Rising Front, Double Extension, Self-Erecting Front, new patent Lever Focussing arrangement, Iris Shutter, Rapid Rectilinear Lens with Iris Diaphragm, and Three Plate Holders.

PRICE LIST.

"Oxford" Automan, as above specification.

Quarter-plate size	... ..	£6 6 0
Extra Plate Holders	... .. each	0 7 6
Carrying Case, Best Quality Black Leather	... ..	0 16 6
" " Stiff Waterproof, Best Quality	... ..	0 12 6

The "Oxford" Camera can be supplied with any makers' lens if of suitable focus, which in the Quarter-plate size is five inches.

5x4 size made to order; any 6in. Lens fitted.

PRICES ON APPLICATION.

THE THORNTON-PICKARD . .

'ROLL FILM'

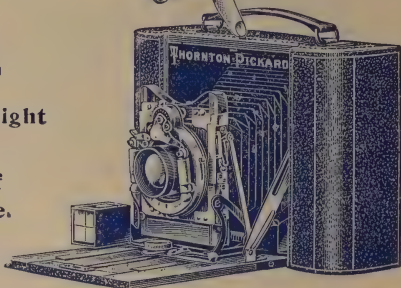
AUTOMAN.

PATENT.

For the $4\frac{1}{4}$ inch Daylight
Loading Spool.

Will take Spools of
any Standard make.

Takes Pictures $4\frac{1}{4}$ by $3\frac{1}{4}$



THE "Roll Film" Automan will be preferred by many on account of the ease with which it may be loaded and unloaded in daylight. It is constructed to take the $4\frac{1}{4}$ inch daylight loading spool, and can also be fitted with an adaptor to take glass plates or cut films in Plate Holders.

Plate Magazine, which carries twelve plates in sheathes, can also be fitted.

The "Roll Film" Automan Camera is fitted with a Rapid Rectilinear Lens, with which is combined the Thornton-Pickard patent Iris Shutter, giving speeds of $\frac{1}{80}$, $\frac{1}{25}$, $\frac{1}{8}$, $\frac{1}{4}$, $\frac{1}{2}$, and 1 second, and Time Exposures of any duration.

Patent Self-Erecting Front, long extension, rising and falling front, new lever focussing arrangement for fine adjustment.

The "Roll Film" Automan Camera folds up into a very small space, of convenient shape and proportion for carrying. It is handsomely covered and presents no projections on the outside.



SPECIFICATION.

The "Roll Film" Automan Set includes Camera with Rising Front, Double Extension, Lever Focussing arrangement, Rapid Rectilinear Lens, with Iris Diaphragm, and Iris Shutter.

PRICE LIST.

"Roll Film" Automan, as above Specification, Quarter-plate size	...	£6 6 0
Plate Adaptor	...	extra 0 15 0
Double Plate Holder	...	each 0 7 6
Carrying Case, best quality Leather	...	0 16 6
" " " Waterproof Cloth	...	0 12 6

The "Roll Film" Automan can be fitted with other makers' lenses if of suitable focus, which is 5 inches in the quarter-plate size.

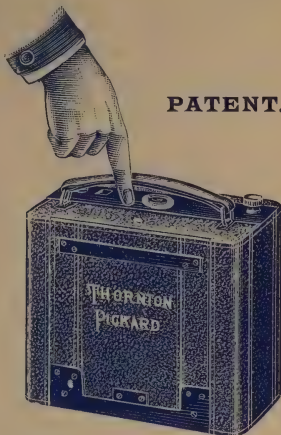
PRICES ON APPLICATION.

The THORNTON-PICKARD

'FOCAL PLANE'**AUTOMAN.**

PATENT.

A New Camera possessing besides the usual advantages of folding cameras a Focal Plane Shutter with all adjustments from the outside.



IN designing this Camera the special advantages of the New Focal Plane Shutter have been carefully preserved and the operation of

**SETTING THE SHUTTER AND
ADJUSTING THE SLIT ARE
PERFORMED FROM THE ..
OUTSIDE.**

For Glass
Plates or
Cut Films
in Plate-
holders.

**SPECIFICATION.**

THE "Focal Plane Automan" set comprises Camera with Self Erecting Front, Rising and Falling Front, Double Extension, Patent Lever Focussing Arrangement, New Patent Focal Plane Shutter, with Slit adjusted from outside. Iris Shutter, Rapid Aplanat Lens, working at F6, and three patent Plate Holders.

**Roll Holder or Plate Magazine
can be fitted.**

PRICE LIST.

"Focal Plane" Automan as above Specification.					Quarter-Plate size.
Quarter-Plate size	...	...	...	...	£10 5 0
Double Plateholders, extra	...	...	...	...	7 6
Carrying Case, best quality leather	...	...	...	...	16 6
" " " waterproof cloth	...	...	...	...	15 0

5 x 4 Size made to Order, Any 6 in. Lens can be fitted.

The **"Focal Plane Automan"** can be fitted with other makers' lenses if of suitable focus, which in the quarter plate size is 5 inches, and 6 inches in the 5 x 4 size.

PRICES ON APPLICATION.

Waterproof Cases,

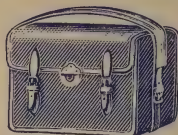
For "Imperial" and other Cameras



PATTERN J.

Description of Pattern J.

Collapsible, Waterproof Tan Twill, lined with Green Baize. Leather Fittings, and Handle and Shoulder Strap.



PATTERN K.

Description of Pattern K.

Solid, Waterproof Tan Tweed Case, Leather bound, lined Green Baize, Leather Handle and Shoulder Strap, nickel Lock and Key.



PATTERN L.

Description of Pattern L.

Solid, Waterproof Mail Cloth, superior quality, Leather bound, fitted with Leather Handle and Shoulder Strap, Nickel lock and Key.

Patterns J, K, and L,

are made to accommodate, Camera, Shutter, three Plate-Holders, Lens, and Focussing Cloth.

Description of Pattern M.

(Stand Case).

Superior Tan Mail Cloth with Tan Leather Fittings.

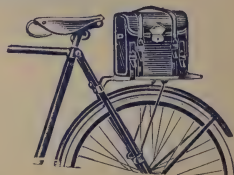
Size.	$4\frac{1}{2} \times 3\frac{1}{2}$	$5 \times 4 \& 9 \times 12 \text{ c/m}$	$6\frac{1}{2} \times 4\frac{1}{2}$	$7\frac{1}{2} \times 5 \& 13 \times 18 \text{ c/m}$	$8\frac{1}{2} \times 6\frac{1}{2}$
Style of Case as described above.					
Pattern J ..	4/-	4/6	5/6	6/6	7/6
Pattern K ..	6/-	7/-	8/6	9/6	10/-
Pattern L ..	10/-	11/-	12/6	14/-	15/-
Pattern M (stand case)	4/6	4/6	4/6	4/6	4/6

CYCLE CAMERA CARRIER.

This attachment is the best and most convenient method yet devised of carrying a camera on a cycle. It is light and easily fitted.

Price 8/6 each.

Camera cases can be fitted with straps so that they may be readily attached at a charge of 2/6 each case.



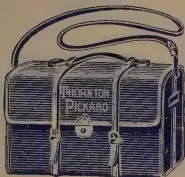
Telegraphic Address: "PICKARD," ALTRINCHAM.

Camera Cases

For Thornton-Pickard Cameras.



PATTERN A.



PATTERN D.



PATTERN C.

Patterns A and B are Waterproof Cloth Cases, Leather Bound, with **Collapsible Sides** and Loose Division Lined with Green Baize, and fitted with Snap Lock and Key and Shoulder Strap.

A To hold Camera, three Slides, Shutter, Lens, Focussing Cloth, etc.

B To hold three extra Slides only.

Patterns F and G are Solid Leather Cases, of Best Quality and Finish.

F To hold same as **C**.

G To hold same as **D**.

Pattern H is a Strong Waterproof Cloth Case, Leather Bound to hold Tripod Stand.

Patterns C and D are Strong Waterproof Cloth Cases, Leather Bound, with **Stiff Sides** and Fast Division, Lined with Green Baize, and Fitted with Snap Lock and Key, Handle and Shoulder Strap, which may also be used Knapsack fashion.

C To hold Camera, three Slides Shutter, Lens, Focussing Cloth, etc.

D To hold Camera, six Slides, Shutter and accessories, or Camera with Lens attached *in situ*, five Slides, Shutter, and accessories; or Stereoscopic Camera, five Slides, Shutter and accessories.

SIZE.	$4\frac{1}{4} \times 3\frac{1}{2}$			5 x 4			$6\frac{1}{2} \times 4\frac{3}{4}$			$7\frac{1}{2} \times 5$			$8\frac{1}{2} \times 6\frac{1}{2}$			10 x 8			12 x 10		
Style of Case as described above.	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.
Pattern A, Waterproof Cloth	0	7	6	0	8	6	0	9	6	0	11	6	0	13	6	0	16	0	...	...	...
Pattern B " "	0	5	6	0	6	6	0	7	6	0	8	6	0	9	6	...	...	...	...	...	...
Pattern C " "	0	14	0	0	15	0	0	16	0	0	18	0	1	0	0	1	3	0	1	8	0
Pattern D " "	0	17	6	0	19	0	1	0	0	1	2	0	1	4	0	1	8	0	1	15	0
Pattern F, Solid Leather ..	1	5	0	1	10	0	1	15	0	1	17	6	2	0	0	2	15	0	3	0	0
Pattern G " "	1	10	0	1	15	0	2	5	0	2	7	6	2	12	6	3	5	0	3	10	0
Pattern H Stand Case.....	0	7	0	0	7	0	0	7	0	0	7	0	0	7	0	0	9	0	...	...	...
Leather Lens Case	0	3	6	0	3	6	0	4	0	0	4	0	0	4	0	0	5	6	0	7	6

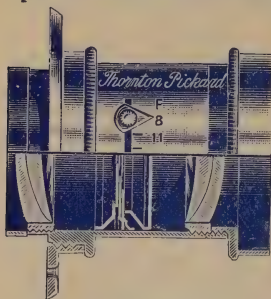
CASES FOR AUTOMAN CAMERAS.

	Black Leather Velvet Lined	Waterproof Cloth.
	£ s. d.	£ s. d.
No 1. To hold Camera and Three Plate Holders	0 16 6	0 12 6
No 2. To hold Camera and Six Plate Holders	0 17 6	0 14 0

When ordering Hand Camera Cases please state in addition to the pattern No. which pattern "Automan" they are for, and whether required in Black Leather or Waterproof Cloth.

Thornton=Pickard Lenses.

"RUBY" & "AMBER" RAPID RECTILINEAR,



F 8, with Iris Diaphragm.

These are good general all-round lenses or all kinds of Photography, including instantaneous work. They are free from distortion, and give perfectly straight lines and fine definition.

These Lenses are of the finest quality that can be obtained at the prices quoted, and whilst they are constructed specially for use with the Thornton-Pickard Cameras they are readily adapted to other Cameras also.

Wide Angle Rectilinear.

These lenses are for use in confined situations, &c. They are fitted with revolving diaphragm and work at f11.

To cover plates ... inches Also	$4\frac{1}{2} \times 3\frac{1}{4}$ 5×4	$6\frac{1}{2} \times 4\frac{3}{4}$	$7\frac{1}{2} \times 5$	$8\frac{1}{2} \times 6\frac{1}{2}$	10×8
"AMBER" Rapid Rectilinear ... Price	£1 7 6	£1 12 0	£2 15 0	£2 15 0	£4 10 0
"RUBY" ... " " " " " "	2 10 0	3 0 0	4 0 0	4 10 0	6 5 0
Focus ... " " " " " inches	5 $\frac{1}{2}$	9	9 $\frac{1}{2}$	11	13 $\frac{1}{2}$
WIDE ANGLE Rectilinear ... Price	£2 0 0	£2 10 0	£4 0 0	£4 10 0	£5 0 0
Focus ... " " " " " inches	4	5 $\frac{1}{2}$	7	7	9

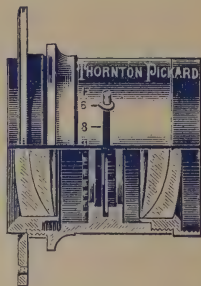
"Ruby Convertible" Lens.

This Lens in its complete form has exceedingly good covering power and definition at full aperture, and when stopped down will give a brilliant picture two or three sizes larger, thus becoming a **wide angle Lens**, when used on a larger plate.

This **useful feature** is obtained by the special nature of the curves in the glass from which the lenses are manufactured. It can also be used as a single lens or long focus by unscrewing the front combination and using the back lens only.

For **landscape work** this is a great advantage.

The **flanges of these Lenses** are made to the R.P.S. (Royal Photographic Society's) standard, and are therefore, interchangeable with all other high-class lenses.



To cover plates ... ins.	Quarter-plate. $4\frac{1}{2} \times 3\frac{1}{4}$	5×4	Half-plate. $6\frac{1}{2} \times 4\frac{3}{4}$	$7\frac{1}{2} \times 5$	Whole-plate. $8\frac{1}{2} \times 6\frac{1}{2}$	10×8	12×10
Largest aperture	f6	f6.5	f7.2	f8	f8.5	f8.5	f9
Equi Focus ... ins.	5	6 $\frac{1}{2}$	7	8	10 $\frac{1}{2}$	13 $\frac{1}{2}$	18 $\frac{1}{2}$
Back Lens ... " "	9 $\frac{1}{2}$	12 $\frac{1}{2}$	13	16	19 $\frac{1}{2}$	24	34
Price	£3 10 0	£3 15 0	£4 0 0	£5 0 0	£5 10 0	£7 5 0	£8 10 0

Stereoscopic Lenses.

Any of the above Lenses of suitable focus can be accurately paired at a charge of 5/- extra.

For Other Makers' Lenses see next page.

PRICE LIST OF LENSES

THAT CAN BE FITTED TO THORNTON-PICKARD CAMERAS

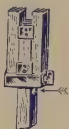
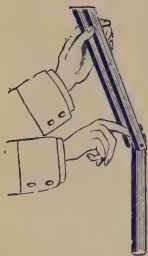
Name	Description	Equiv Focus ins.	Largest Aper- ture	Size of Plate covered	Price. £ s. d.
Cooke	Anastigmat Series III.	5	F 6.5	$4\frac{1}{2} \times 3\frac{1}{2}$	4 2 0
"	" "	6	F 6.5	5×4	4 12 0
"	" "	$7\frac{1}{2}$	F 6.5	$6\frac{1}{2} \times 4\frac{3}{4}$	5 12 0
"	" "	$8\frac{1}{2}$	F 6.5	7×5	6 3 0
"	Series V.	11	F 8	$8\frac{1}{2} \times 6\frac{1}{2}$	7 17 0
"	" "	13	F 8	10×8	10 2 0
"	" "	16	F 8	12×10	15 2 6
"	Extension for 5 in. Cooke Lens	7.8	F 6.5	$4\frac{1}{2} \times 3\frac{1}{2}$	1 0 0
"	" 6 in. "	9.3	F 6.5	5×4	1 3 0
"	" $7\frac{1}{2}$ in. "	11.7	F 6.5	$6\frac{1}{2} \times 4\frac{3}{4}$	1 7 0
"	" $8\frac{1}{2}$ in. "	12.8	F 6.5	7×5	1 10 0
Beck-Steinheil	Orthostigmat, Series I.	$4\frac{1}{2}$	F 6.3	$4\frac{1}{2} \times 3\frac{1}{2}$	4 15 0
"	" "	$5\frac{1}{2}$	F 6.3	5×4	6 0 0
"	" "	$7\frac{1}{2}$	F 6.3	$6\frac{1}{2} \times 4\frac{3}{4}$	7 5 0
"	" "	$8\frac{1}{2}$	F 6.8	$7\frac{1}{2} \times 5$	8 10 0
"	" "	11	F 6.8	$8\frac{1}{2} \times 6\frac{1}{2}$	13 0 0
"	Series II. B.	$5\frac{5}{8}$	F 7.7	$4\frac{1}{2} \times 3\frac{1}{2}$	5 15 0
Ross-Zeiss	Convertible Anastigmat Series VIIa.	$4\frac{1}{2}$	F 6.3	$4\frac{1}{2} \times 3\frac{1}{2}$	7 15 0
"	" "	5	F 6.3	5×4	8 5 0
"	" "	$6\frac{1}{2}$	F 6.3	$6\frac{1}{2} \times 4\frac{3}{4}$	9 15 0
"	" "	8	F 6.3	$7\frac{1}{2} \times 5$	11 15 0
"	" "	$9\frac{1}{2}$	F 6.3	$8\frac{1}{2} \times 6\frac{1}{2}$	15 5 0
Ross-Goerz	Double Anastigmat Series III.	5	F 6.8	$4\frac{1}{2} \times 3\frac{1}{2}$	5 5 0
"	" "	6	F 6.8	5×4	6 5 0
"	" "	7	F 6.8	$6\frac{1}{2} \times 4\frac{3}{4}$	7 5 0
"	" "	$8\frac{1}{2}$	F 6.8	$7\frac{1}{2} \times 5$	8 15 0
"	" "	$9\frac{1}{2}$	F 6.8	$8\frac{1}{2} \times 6\frac{1}{2}$	10 10 0
Ross' Unar	Anastigmat, Series IB.	$5\frac{1}{2}$	F 4.5	$4\frac{1}{2} \times 3\frac{1}{2}$	5 10 0
"	" "	6	F 5	$4\frac{1}{2} \times 3\frac{1}{2}$	6 0 0
Goerz	Double Anastigmat Series III.	$4\frac{1}{2}$	F 6.8	$4\frac{1}{2} \times 3\frac{1}{2}$	5 5 0
"	" "	6	F 6.8	5×4	6 5 0
"	" "	7	F 6.8	$6\frac{1}{2} \times 4\frac{3}{4}$	7 5 0
"	" "	$8\frac{1}{2}$	F 6.8	$7\frac{1}{2} \times 5$	8 15 0
"	" "	$9\frac{1}{2}$	F 6.8	$8\frac{1}{2} \times 6\frac{1}{2}$	10 10 0
Dallmeyer	Stigmatic Series II.	$5\frac{1}{2}$	F 6	$4\frac{1}{2} \times 3\frac{1}{2}$	5 15 0
"	" "	$6\frac{1}{2}$	F 6	5×4	6 15 0
"	" "	$7\frac{1}{2}$	F 6	$6\frac{1}{2} \times 4\frac{3}{4}$	8 2 6
"	" "	9	F 6	$7\frac{1}{2} \times 5$	10 10 0
"	" "	$10\frac{1}{2}$	F 6	$8\frac{1}{2} \times 6\frac{1}{2}$	13 10 0
No. 1 Beck-Steinheil Telephoto Attachment for R.R. Lenses of 4 to					
				$5\frac{1}{2}$ in. focus	4 0 0
No. 2	"	"	"	5 to $6\frac{1}{2}$ in.	4 0 0
No. 4	"	"	"	6 to 8 in.	4 15 0
No. 5	"	"	"	8 to $9\frac{1}{2}$ in.	5 5 0
Dallmeyer Telephoto Attachment for R.R. Lenses of 5 inch focus ...					
				6	3 15 0
				$7\frac{1}{2}$	4 10 0

THORNTON-PICKARD Patent AUTOMATIC STANDS.

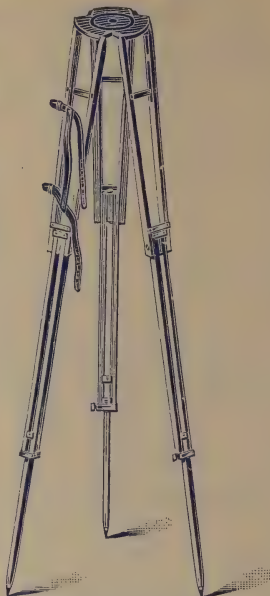
Machine Made and Hand Polished, with
Patent Self-Locking Joints.

PRICES. Two-Fold. Three-Fold.

No 1.	For Quarter-Plate, Half-Plate, and Whole-Plate Cameras	13/-	17/6
	Stand Top for same	3/6	3/6
No. 2	Extra strong for 10×8 and 12×10 Stand Top for same	18/-	22/6
	Special Midget Stand, 14 in. long	3/6	3/6
Patent	Folding Triped Screw fitted to above to suit Thornton-Pickard Cameras, Free.	12/6	
Do.	do to fit other makers' Cameras	3/-	3/-
	Lens support (adjustable) for tele- photo or other heavy lenses	12/6	



SELF-LOCKING JOINTS.



THREE-FOLD STAND.

FOLDING STAND.

HAND CAMERA STANDS.

Drawn from Aluminium Rods, and beautifully finished like dull silver. The Stands are erected by simply drawing out the joints which automatically fix themselves, and can be used either fully extended or as short as may be desired.

PRICE LIST.	Height		Price		
	closed	opened			
	inches	inches	£	s.	d.
No. 1 Polished Wood Tubular Two-Fold Stand ...	27	49	12	6	
" 2 Black Oxydized Brass Round Tubes ...	15	49	12	6	
" 3 Aluminium Round Tubes ...	15	49	17	6	
<i>Nos. 2 and 3 are with Automatic Fixing.</i>					
No. 4 Aluminium Triangular Tubes ...	15	49	1	5	0
" 5 Aluminium Triangular Tubes, extra long ...	17	54	1	12	0
<i>Nos. 4 and 5 are with Automatic Fixing and Closing.</i>					
SOLID LEATHER CASE or any the above Stands...				6	0
Walking Stick Stand.					
No. 6 Black Oxydized Aluminium Round Tubes, Three Extensions	34	60	1	12	6



NEW PATENT SPEED CALCULATOR

Shows at a glance what speed is obtained by the variation of the Adjustable Slit and the Speed Indicator.

A real help to Focal Plane Workers.

This Calculator can be used with any Focal Plane Shutter.

Price 3/6, supplied without Shutter.

Plumb Indicator.

For Attaching to Camera.
CANNOT GET LOST. REQUIRES NO SKILL TO FIX.

Price 6d. Each. Post Free, 7d.

*Including Screws complete for fixing.
Also supplied to dealers on Show Cards containing
one dozen,*



PATENT Recorder.

FOR DARK SLIDES
AND PLATEHOLDERS.

Shows at a glance
which plates have
been exposed.



Prevents two
pictures being taken
on one plate.

One Recorder is required for each plate—that is, two for a double Slide or one for a Single Slide.

Price 6d. each. Fitted to slide, 3d. each extra.

NOTE—The Recorder is fitted to all Dark Slides and Plate Holders of our manufacture without extra charge.

Rubber Moulding PATENT.

For fitting shutters to Lenses.

Made in seven different thicknesses,
as shown.

Price 8d. per foot.



N^o 1 2 3 4 5 6 7
1/4 3/8 1/2 5/8 3/4 7/8 1" thick

FITTING. It should be cut to the required length with a sharp knife and sprung into the aperture with the rib or flange on the inside.

Thornton-Pickard Manufacturing Co. Ltd., Altrincham.

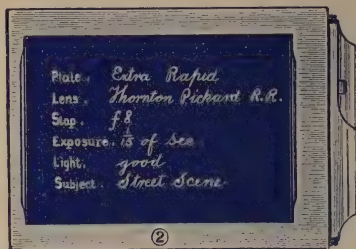
THORNTON-PICKARD Patent Plate Holder,

With
PATENT SPRING BAR
and
NEW PATENT LIGHT TRAP.

Of best
workmanship and
well finished.

For Plates or Films

Absolutely light-
proof to the most
sensitive plates.



Plates changed
in half the time
and in the dark.

The Shutters are
made of
Aluminium, and
pull right out.

The important features of this Plate Holder are the automatic Spring Bar, which allows of the plate being instantly put in or taken out by simple pressing with the finger. The Aluminium shutters, which are not affected by either heat or damp, and the new patent automatic Light Trap so arranged as to make the Plate Holder absolutely safe to the most sensitive plates.

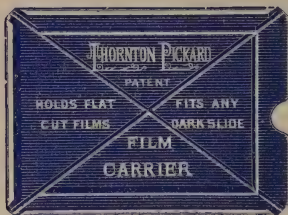
PRICES.

Each Plate Holder takes two plates, or two cut films in Carriers.						
For Plates.....	3½ × 4½	5 × 4	6½ × 4½	7½ × 5	8½ × 6½	10 × 8
Price each.....	8/6	9/6	10/6	12/-	15/-	21/-

Film Carrier.

THORNTON-PICKARD
PATENT.

A
Perfect
Film Carrier
for
using
Cut Films.



LIGHT.
RIGID.
CHEAP.

This Carrier is for Sheet or Cut Films.

It will fit any make of Dark Slide or Plate Holder that a plate will fit, and holds the film perfectly straight and flat. It is made of extremely thin sheet metal.

Strength and Rigidity are obtained by the indented ribs or corrugations that run in various directions.

PRICE LIST.

To take one film.	Quarter-plate 4½ × 3½	5 × 4	Half-Plate 6½ × 4½	7½ × 5	Whole-plate 8½ × 6½
Price each	6d.	6d.	9d.	10d.	1/-
Postage extra	1d.	1d.	1d.	1d.	2d.
Price in boxes containing six	2/6	2/9	4/-	4/6	5/6
Postage extra	2d.	2d.	3d.	3d.	3d.

"Amber" & "Tourist" Outfits.

THE following sets of apparatus have been arranged for the convenience of purchasers who are requiring Complete Outfits, and may be taken as the best selection that can be made in proportion to the cost. At the same time we shall be glad to alter the arrangement of any outfit to suit the requirements of the purchaser.

"AMBER" OUTFITS "Amber" Outfit No. 2 (for Hand or Stand).	Quarter- plate. 4½ x 3½	5 x 4 and 9 x 12 c/m	Half- plate. 6½ x 4½	7½ x 5 and 13 x 18 c/m	Whole- plate 8½ x 6½
Camera	2 13 6	3 2 6	3 8 6	4 5 0	4 18 6
Double Plate Holder	- 8 6	- 9 6	- 10 6	- 12 0	- 15 0
Turntable	17 6	17 6	1 0 0	1 5 0	1 5 0
Stand, Twofold	- 13 0	- 13 0	- 13 0	- 13 0	- 13 0
Time and Inst. Shutter with Speed Indicator, & Time exposure valve, fitted to front of Camera	1 0 6	1 1 0	1 2 6	1 4 6	1 7 6
"Amber" R.R. Lens	1 7 6	1 7 6	1 12 0	2 15 0	2 15 0
Bright Finder	- 8 6	- 8 6	- 8 6	- 8 6	- 8 6
	7 9 0	7 19 6	8 15 0	11 3 0	12 2 6
Waterproof Case, pattern A	- 7 6	- 8 6	- 9 6	- 11 6	- 13 6
"AMBER" Outfit No. 3 (most complete for Hand or Stand).					
Camera	2 13 6	3 2 6	3 8 6	4 5 0	4 18 6
Three Double Plate Holders	1 5 6	1 8 6	1 11 6	1 16 0	2 5 0
Turntable	17 6	17 6	1 0 0	1 5 0	1 5 0
Stand, Three-fold, to fit Turntable ..	- 17 6	- 17 6	- 17 6	- 17 6	- 17 6
Time and Inst. Shutter with Speed, Indicator, & Time exposure valve, fitted to the front of Camera ..	1 0 6	1 1 0	1 2 6	1 4 6	1 7 6
"Ruby" R.R. Lens	2 10 0	2 10 0	3 0 0	4 0 0	4 10 0
Wide Angle Lens	2 0 0	2 0 0	2 10 0	4 0 0	4 0 0
Bright Finder	- 8 6	- 8 6	- 8 6	- 8 6	- 8 6
	11 13 6	12 5 6	13 18 6	17 16 6	19 12 0
Waterproof Case, pattern C	- 14 0	- 15 0	- 16 0	- 18 6	1 0 0

"TOURIST OUTFITS." "Tourist" Outfit No. 2 (for Hand or Stand)	TOURIST OUTFITS.				
Camera	3 10 0	4 0 0	4 10 0	5 0 0	6 0 0
Double Plate Holder	- 8 6	- 9 6	- 10 6	- 12 0	- 15 0
Turntable	- 17 6	- 17 6	1 0 0	1 5 0	1 5 0
Stand, Twofold	- 13 0	- 13 0	- 13 0	- 13 0	- 13 0
Time and Inst. Shutter with Speed Indicator, & Time exposure valve, fitted to front of Camera	1 0 6	1 1 0	1 2 6	1 4 6	1 7 6
"Amber" R.R. Lens	1 7 6	1 7 6	1 12 0	2 15 0	2 15 0
Bright Finder	- 8 6	- 8 6	- 8 6	- 8 6	- 8 6
	8 5 6	8 17 0	9 16 6	11 18 0	13 4 0
Waterproof Case, pattern A	- 7 6	- 8 6	- 9 6	- 11 6	- 13 6
"Tourist" Outfit No. 3. (most complete for Hand or Stand)					
Camera	3 10 0	4 0 0	4 10 0	5 0 0	6 0 0
Three Double Plate Holders	1 5 6	1 8 6	1 11 6	1 16 0	2 5 0
Turntable	- 17 6	- 17 6	1 0 0	1 5 0	1 5 0
Stand, Three-fold, to fit Turntable ..	- 17 6	17 6	- 17 6	- 17 6	- 17 6
Time and Inst. Shutter with Speed Indicator and Time exposure valve fitted to the front of Camera	1 0 6	1 1 0	1 2 6	1 4 6	1 7 6
"Ruby" R.R. Lens	2 10 0	2 10 0	3 0 0	4 0 0	4 10 0
Wide Angle Lens	2 0 0	2 0 0	2 10 0	4 0 0	4 0 0
Bright Finder	- 8 6	- 8 6	- 8 6	- 8 6	- 8 6
	12 11 0	13 3 0	15 0 0	18 11 6	20 14 6
Waterproof Case, pattern C	- 14 0	- 15 0	- 16 0	- 18 6	1 0 0

Other Lenses can be fitted if required.

"Ruby" Outfits.

"RUBY" Outfit No. 1 (for Hand or Stand).	Quarter-plate $4\frac{1}{2} \times 3\frac{1}{2}$	5 x 4 and 9 x 12 c/m	Half-plate $6\frac{1}{2} \times 4\frac{1}{2}$	$7\frac{1}{2} \times 5$ and 13 x 18 c/m	Whole plate $8\frac{1}{2} \times 6\frac{1}{2}$	10 x 8
Camera, including Turntable and one Double Plate-Holder	5 8 0	5 9 6	6 8 0	7 7 0	8 17 6	10 1 0
Stand, three-fold to fit Turntable	- 17 6	- 17 6	- 17 6	- 17 6	- 17 6	1 2 6
Time and Inst. Shutter with Speed Indicator, and Time Exposure Valve, fitted to Camera front	1 0 6	1 1 0	1 2 6	1 2 6	1 4 6	1 7 6
Ruby" R.R. Lens	2 10 0	2 10 0	3 0 0	4 0 0	4 10 0	6 5 0
Bright Finder	- 6	- 8 6	- 8 6	- 8 6	- 8 6	- 8 6
	10 12 6	10 6 6	11 16 6	13 15 6	15 18 0	19 4 6

Waterproof Case (Pattern C)	- 14 0	- 15 0	16 0	- 18 0	1 0 0	1 3 0
-----------------------------------	--------	--------	------	--------	-------	-------

"RUBY" Outfit No 2 (complete outfit for Stereoscopic and ordinary Photography, for Hand or Stand).						
Camera, Turntable, and three Double Plate-holders	—	—	7 9 0	8 11 0	10 7 6	—
Stand, three-fold, to fit Turntable	—	—	17 6	- 17 6	- 17 6	—
Time and Inst. Shutter with Speed Indicator, and Time Exposure Valve, fitted to front of Camera	—	—	1 8 6	1 8 6	1 14 6	—
Adjustable Panel to Shutter	—	—	- 7 6	- 7 6	- 7 6	—
Stereoscopic Division fitted	—	—	- 5 0	- 5 0	- 5 0	—
"Ruby" R.R. Lens	—	—	3 0 0	4 0 0	4 10 0	—
Pair of "Amber" R.R. Stereo Lenses	—	—	3 0 0	3 0 0	3 0 0	—
Bright Finder	—	—	- 8 6	- 8 6	- 8 6	—
When adjustable panels are not required, a plain panel may be substituted, price 2/-	—	—	16 16 6	18 18 0	21 10 6	—
Waterproof Case (Pattern D)	—	—	1 0 0	1 2 0	1 4 0	—
Pair of "Ruby" R.R. Stereo Lenses (instead of "Amber" Lenses)	—	—	5 5 0	5 5 0	5 5 0	—

"RUBY" Outfit No. 3 (for Hand or Stand).						
Camera, Turntable, and three Double Plate Holders	6 3 0	6 8 6	7 9 0	8 11 0	10 7 6	12 3 0
Stand, three-fold, to fit Turntable	- 17 6	- 17 6	- 17 6	- 17 6	- 17 6	1 2 6
Time and Inst. Shutter with Speed Indicator, and Time Exposure Valve, fitted to Camera front	1 0 6	1 1 0	1 2 6	1 2 6	1 4 6	1 7 6
"Ruby" Convertible Lens	3 10 0	3 15 0	4 0 0	5 0 0	5 10 0	7 5 0
Wide Angle Lens	2 0 0	2 0 0	2 10 0	4 0 0	4 0 0	5 0 0
Bright Finder	- 8 6	- 8 6	- 8 6	- 8 6	- 8 6	8 6
(Cooke Lens may be substituted if preferred)	13 19 6	14 10 6	16 7 6	19 19 6	22 8 0	27 6 6
Waterproof Case (Pattern C)	- 14 6	- 15 0	- 16 0	- 18 0	1 0 0	1 3 0
Focal Plane Shutter, New Model, with Speed Indicator & Calculator	0	2 10 0	2 15 0	3 2 6	3 10 0	4 4 0

"RUBY" Outfit No. 4 (for Hand or Stand).						
Camera, Turntable, and six Double Plate Holders	7 6 6	7 17 0	9 0 6	10 7 0	12 12 6	15 6 0
Stand, threefold, to fit Turntable	- 17 6	- 17 6	- 17 6	- 17 6	- 17 6	1 2 6
Time and Inst. Shutter with Speed Indicator and Time Exposure Valve fitted to Camera front	1 0 6	1 1 0	1 2 6	1 2 6	1 4 6	1 7 6
Focal Plane Shutter, New Model, with Speed Indicator & Calculator	2 5 0	2 10 0	2 15 0	3 2 6	3 10 0	4 4 0
Ross Zeiss Lens. Series VIIa	7 15 0	8 5 0	9 15 0	11 15 0	15 5 0	—
Wide Angle Lens	2 0 0	2 0 0	2 10 0	4 0 0	4 0 0	5 0 0
Bright Finder	- 8 6	- 8 6	- 8 6	- 8 6	- 8 6	- 8 6
	21 15 0	22 19 0	26 9 0	31 13 0	37 18 0	—

Waterproof Case (Pattern D)	- 17 6	- 19 0	1 0 0	1 2 0	1 4 0	1 8 0
Case for three extra Plate-Holders	- 5 6	- 6 6	- 7 6	- 8 6	- 9 6	—
Case for Tripod Stand	- 7 0	- 7 0	- 7 0	- 7 0	- 7 0	- 9 0
Brassbinding Camera	- 15 0	- 16 6	- 18 0	- 18 0	1 0 0	1 3 0
Brassbinding Plate Holders	- 3 6	- 3 6	- 4 0	- 4 0	- 5 0	- 5 6

"Royal Ruby" Outfits.

Also "ROYAL RUBY" Triple Extension Outfits.

"ROYAL RUBY" Outfit No. 1 (for Hand or Stand.)	Quarter-plate. $4\frac{1}{4} \times 3\frac{1}{4}$	5 x 4	Half-plate. $6\frac{3}{4} \times 4\frac{3}{4}$	$7\frac{1}{2} \times 5$	Whole plate. $8\frac{1}{2} \times 6\frac{1}{2}$	10×8
Camera, including Turntable and one Double Plate-Holder.....	6 6 0	6 9 6	7 18 0	8 17 0	10 12 6	12 1 0
Stand, three-fold, to fit Turntable.....	0 17 6	0 17 6	0 17 6	0 17 6	0 17 6	1 2 6
Time and Inst. Shutter, with Speed Indicator, and Time Exposure Valve.....	1 0 6	1 1 0	1 2 6	1 2 6	1 4 6	1 7 6
"Ruby" R.R. Lens.....	2 10 0	2 10 0	3 0 0	4 0 0	4 10 0	6 5 0
Bright Finder.....	0 8 6	0 8 6	0 8 6	0 8 6	0 8 6	0 8 6
	11 2 6	11 6 6	13 6 6	15 5 6	17 13 0	21 4 6
Waterproof Case (Pattern C).....	0 14 0	0 15 0	0 16 0	0 18 0	1 0 0	1 3 0

"ROYAL RUBY" Outfit No. 3 (for Hand or Stand.)						
Camera, Turntable, and three Double Plate Holders.....	7 3 0	7 9 6	8 17 0	10 1 0	12 2 6	14 3 0
Stand, three-fold, to fit Turntable.....	0 17 6	0 17 6	0 17 6	0 17 6	0 17 6	1 2 6
Time and Inst. Shutter with Speed Indicator, and Time Exposure Valve.....	1 0 6	1 1 0	1 2 6	1 2 6	1 4 6	1 7 6
"Ruby" convertible Lens.....	3 10 0	3 15 0	4 0 0	5 0 0	5 10 0	7 5 0
Wide Angle Lens.....	2 0 0	2 0 0	2 10 0	4 0 0	4 0 0	5 0 0
Bright Finder.....	0 8 6	0 8 6	0 8 6	0 8 6	0 8 6	0 8 6
(Cooke Lens may be substituted if preferred.)	14 19 6	15 10 6	17 17 6	21 9 6	24 3 0	29 6 6
Waterproof Case (Pattern C)	0 14 6	0 15 0	0 16 0	0 18 0	1 0	1 3 0
Focal Plane Shutter fitted to Camera with Speed Indicator	2 5 0	2 10 0	2 15 0	3 2 6	3 10 0	4 4 0

TRIPLE EXTENSION.

"ROYAL RUBY, Triple Extension Outfit No. 3 (for Hand or Stand.)						
Camera, Turntable, and three Double Plate Holders.....	9 3 0	9 11 0	10 1 6	11 6 0	13 5 0	
Stand, three-fold, to fit Turntable.....	0 17 6	0 17 6	0 17 6	0 17 6	0 17 6	
Time and Inst. Shutter with Speed Indicator, and Time Exposure Valve.....	1 0 6	1 1 0	1 2 6	1 2 6	1 4 6	
"Ruby" Convertible Lens.....	3 10 0	3 15 0	4 0 0	5 0 0	5 10 0	
Wide Angle Lens.....	2 0 0	2 0 0	2 10 0	4 0 0	4 0 0	
Bright Finder.....	0 8 6	0 8 6	0 8 6	8 6	0 8 6	
(Cooke Lens may be substituted if preferred.)	16 19 6	17 13 0	19 0 0	22 14 6	25 5 6	
Waterproof Case (Pattern C.)	0 14 6	0 15 0	0 16 0	0 18 6	1 0 0	
Focal Plane Shutter fitted to Camera with Speed Indicator.	2 5 0	2 10 0	2 15 0	3 2 6	3 10	

"ROYAL RUBY" Triple Extension Outfit No. 4 (for Hand or Stand.)						
Camera, Turntable, and six Double Plate Holders.....	10 8 6	10 13 6	11 13 0	13 2 0	15 10 0	
Stand, threefold, to fit Turntable.....	- 17 6	- 17 6	- 17 6	- 17 6	- 17 6	
Time and Inst. Shutter with Speed Indicator and Time Exposure Valve.....	1 0 6	1 1 0	1 2 6	1 2 6	1 4 6	
Focal Plane Shutter fitted to Camera with Speed Indicator.....	2 5 0	2 10 0	2 15 0	3 2 6	3 10 0	
Ross Zeiss Lens. Series VII.....	7 15 0	8 5 0	9 15 0	11 15 0	15 5 0	
Wide Angle Lens.....	2 0 0	2 0 0	2 10 0	4 0 0	4 0 0	
Bright Finder.....	- 8 6	- 8 6	- 8 6	- 8 6	- 8 8	
	18 5 0	19 1 6	20 11 6	24 10 6	27 10 6	
Waterproof Case (Pattern D).....	- 17 6	- 13 0	1 0 0	1 2 0	1 4 0	1 8 0
Case for three extra Plate Holders.....	- 5 6	- 6 6	- 7 6	- 8 6	- 9 6	-
Case for Tripod Stand.....	- 7 0	- 7 0	- 7 0	- 7 0	- 7 0	- 9 0
Brassbinding Camera.....	- 15 0	- 16 6	- 18 0	- 18 0	1 0 0	1 3 0
Brassbinding Plate Holders.....each	- 3 6	- 3 6	- 4 0	- 4 0	- 5 0	- 5 6

PRICE LIST OF FOCAL PLANE SHUTTERS.

ORIGINAL MODEL, including Speed Indicator and Calculator.

ENGLISH AND AMERICAN SIZES.		CONTINENTAL SIZES.	
$4\frac{1}{2} \times 3\frac{1}{2}$ (quarter-plate) ...	£1 5 0	$8\frac{1}{2} \times 6\frac{1}{2}$ (whole-plate) ...	£2 10 0
5×4 ...	1 10 0	9×12 Centimetres ...	£1 10 0
$6\frac{1}{2} \times 4\frac{1}{2}$...	1 15 0	13×18 ...	2 2 6
		18×24 ...	3 0 0
		24×30 ...	4 5 0

NEW MODEL, Including Speed Indicator and Calculator.

ENGLISH AND AMERICAN SIZES.		CONTINENTAL SIZES.	
$4\frac{1}{2} \times 3\frac{1}{2}$ (quarter-plate) ...	£2 5 0	9×12 Centimetres ...	£2 7 6
5×4 ...	2 10 0	13×18 ...	3 6 0
$6\frac{1}{2} \times 4\frac{1}{2}$...	2 15 0	18×24 ...	4 4 0
7×5 ...	3 6 0		

No extra charge is made for fitting to our own Cameras, but when fitting to those of other makers a change of from $2/6$ to $10/-$ is made, according to the size of Shutter and the amount of work involved.

SHUTTER ACCESSORIES.

Patent Time Exposure Valve with "Arabesque" Ball Tube & Teat $6/9$
 "Arabesque" Ball Tube and Teat complete ... $1/9$
 "Ball and Tube only for Studio Shutter ... $2/-$
 "Teat for Studio Shutter ... $1/-$
 "Rubber Moulding, per foot ... $8d.$
 Adaptors for fitting Shutters to more than one Lens, Rubber only $8d.$
 "Wooden, lined with Rubber, up to $2\frac{1}{2}$ inches ... $1/6$
 "any size larger ... $2/-$
 " "

Brass Binding Shutters, $5/-$ extra up to 3in. sizes, larger sizes in proportion.

Self-Capping Blind. Both T. and I. and Snap-Shot Shutter can be fitted. See page 9. Prices up to $2\frac{1}{2}$ in. size ... $5/-$ extra
 "3in. " ... $7/6$ "

Larger sizes and Stereoscopic size ... $5/-$ extra
 White Metal Fittings to Shutters ... 3 in. $1/6$, 3 in. $2/$, 5 in. $2/6$
 Extra Panels for Behind Lens Shutters, up to $2\frac{1}{2}$ in. $1/6$, 3 in. $2/$, 5 in. $2/6$
 Ditto ditto Stereoscopic Shutter $2/-$, with Adjustable Centre $7/6$

INSTRUCTIONS FOR ORDERING.

FOR ORDINARY SHUTTERS.—Please send a narrow strip of paper just long enough to meet round the Lens Hood or Tube, not an impression or pencil drawing. Insist upon having the Shutter made a good fit upon the Lens. The Shutters work equally well fitted to the Lens Hood or Lens Body, can then be fitted so that when the lens is screwed home the Iris diaphragm will be in the correct position.

FOR BEHIND LENS SHUTTERS.—When sending flanges or panels to be fitted, please make an arrow mark V showing the top. The flange or shutter can then be fitted so that when the lens is screwed home the Iris diaphragm will be in the correct position.

FOR STEREOGRAPHIC SHUTTERS.—In addition to strip as above, please state exact distance apart of Lenses from centre to centre.
 FOR FOCAL PLANE SHUTTERS.—This Shutter is fitted into the back of the Camera in the same way as the Reversible Back, and, in fact, takes the place of it. The Dark Slide or Plate Holder fits into the back of the Shutter in the usual manner.
 For fitting, the Reversible Back with Focussing Screen and a Dark Slide or Plate Holder must be sent to us when ordering, otherwise we supply the Shutter with an adapting frame which may be cut down and fitted to the required size by any cabinet-maker. If the Camera has no Reversible Back it is sufficient to send a Dark Slide or Plate Holder.

Price List of Thornton-Pickard Cameras, &c.

Size of Plate in inches... ..	Quarter-Plate 3½ x 4½	5 x 4 and 9 x 12 c/m.		Half-Plate 6½ x 4¾		7½ x 5 13 x 18 c/m		Whole-plate 8½ x 6½		10 x 8		12 x 10 and 24 x 30 c/m.	
	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Camera only, "Amber" pattern	2 13 6	3 2 6	4 5 0	3 8 6	4 5 0	4 18 6	—	—	—	—	—	—	—
Camera only, "Tourist" pattern	3 10 0	4 0 0	5 0 0	4 10 0	5 0 0	6 0 0	—	—	—	—	—	—	—
Camera only, "Ruby" pattern	4 0 0	4 2 6	5 10 0	4 17 6	5 10 0	6 17 6	—	—	—	—	—	—	—
Camera only, "Royal Ruby" pattern	5 0 0	5 2 6	7 0 0	6 7 6	7 0 0	8 12 6	—	—	—	—	—	—	—
*Camera only, "Royal Ruby" Triple Extension	7 0 0	7 5 0	8 5 0	7 10 0	8 5 0	9 15 0	—	—	—	—	—	—	—
Camera "Imperial" with Turntable	—	—	3 10 0	3 0 0	3 10 0	4 4 0	—	—	—	—	—	—	—
Double Plate Holder	8 6	9 6	12 0	10 6	12 0	15 0	—	—	—	—	—	—	—
" " with metal tops	7 6	8 6	—	9 6	—	—	—	—	—	—	—	—	—
Double Slide, Bookform	14 0	16 0	1 0 0	17 6	1 0 0	1 2 6	—	—	—	—	—	—	—
Turntable fitted to Camera	17 6	17 6	1 5 0	1 0 0	1 5 0	1 5 0	—	—	—	—	—	—	—
Two-fold Stand to fit Turntable	13 0	13 0	13 0	13 0	13 0	13 0	—	—	—	—	—	—	—
Three-fold Stand to fit Turntable	17 6	17 6	17 6	17 6	17 6	17 6	—	—	—	—	—	—	—
Top for Stand with folding Tripod screw ..	3 6	3 6	3 6	3 6	3 6	3 6	—	—	—	—	—	—	—
Time and Inst. Shutter with Speed Indicator	15 6	16 0	17 6	17 6	17 6	19 6	—	—	—	—	—	—	—
Time Exposure Valve fitted to Shutter ..	5 0	5 0	5 0	5 0	5 0	5 0	—	—	—	—	—	—	—
"Amber" Rapid Rectilinear Lens, Iris diaph.	1 7 6	1 7 6	2 15 0	1 12 0	2 15 0	2 15 0	—	—	—	—	—	—	—
"Ruby" Rapid Rectilinear Lens, Iris diaph.	2 10 0	2 10 0	4 0 0	3 0 0	4 0 0	4 10 0	—	—	—	—	—	—	—
"Ruby" Convertible Lens, Iris diaph. ..	3 10 0	3 15 0	5 0 0	4 0 0	5 0 0	5 10 0	—	—	—	—	—	—	—
Bright Finder for Hand Camera work ..	8 6	8 6	8 6	8 6	8 6	8 6	—	—	—	—	—	—	—
Larger Bright Finder for Hand Camera Work	12 6	12 6	12 6	12 6	12 6	12 6	—	—	—	—	—	—	—
Stereoscopic Shutter Behind Lens, for Stereo	—	—	1 5 6	1 5 6	1 5 6	1 7 6	—	—	—	—	—	—	—
lenses, including extra panel for single lens }	—	—	7 6	7 6	7 6	7 6	—	—	—	—	—	—	—
Adjustable Centres to Stereo Shutter, extra	—	—	5 0	5 0	5 0	5 0	—	—	—	—	—	—	—
Stereoscopic Division, detachable	—	—	—	—	—	—	—	—	—	—	—	—	—

* The "Royal Ruby Triple Extension Camera is not listed above 1/1 plate size, but larger sizes can be supplied for special orders.

Size of Plate in inches ...	Quarter-Plate $4\frac{1}{4} \times 3\frac{1}{4}$	5×4 and 9×12 c/m.	Half-Plate $6\frac{1}{2} \times 4\frac{1}{2}$	$7\frac{1}{2} \times 5$ and 13×18 c/m.	Whole-Plate $8\frac{1}{2} \times 6\frac{1}{2}$	10×8	12×10 and 24×30 c/m.
	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Brassbinding Cameras, All Patterns	15 0	16 6	18 0	18 0	1 0 0	1 3 0	1 9 0
Brassbinding Double Plate Holder or Slide	3 6	3 6	4 0	4 0	5 0	5 6	7 0
Special White Metal Fittings to Camera	1 0 0	1 5 0	1 8 0	1 12 0	1 15 0	1 17 6	2 5 0
Do. Slide	3 6	3 6	4 0	4 6	5 0	6 0	7 0
Do. Binding, same as Brassbinding							
Extra Panels for "Tourist" and "Amber"	1 6	1 6	1 6	1 6	2 0	2 6	2 6
Camera front							
Extra Panels for "Ruby" Camera front	2 0	2 0	2 6	2 9	2 9	3 0	3 6
Do. for "Royal Ruby" Camera							
front or "Royal Ruby" Triple Extension	2 3	2 3	2 9	3 0	3 0	3 6	4 0
front							
Plate Carriers for smaller sizes of Plates	—	—	1 4	1 6	1 8	2 0	2 6
outside measure							
(Two required for each Plate Holder or Dark Slide).							
Film Carriers for Cut Films	6	6	9	0 10	1 0	—	—
(Two required for each Plate Holder or Dark Slide).	2 6	2 9	4 0	4 6	5 6	—	—
Special Waterproof Focussing Cloth	4 6	4 6	4 6	4 6	4 6	4 6	4 6
Complete Dark Room & Chemical Outfit	15 0	1 0 0	1 5 0	1 10 0	2 0 0	—	—
for beginners							
Strong Dovetailed Box, with Lock and	17 6	19 0	1 0 0	1 3 0	1 3 0	1 8 0	1 15 0
Key, to contain everything for travelling							
or storing purposes							
Luggage Carriers, for Bicycle, each	8 6	8 6	8 6	8 6	8 6	8 6	8 6
Waterproof Cloth Cases (see page 1300 & 1301).							

The above prices are subject to Discount 5 % for Cash with Order.

THE THORNTON-PICKARD MANUFACTURING CO. LTD.

Telegraphic Address:

"PICKARD, ALTRINCHAM."

Telephone No. 69, Altrincham.

THORNTON-PICKARD

PRIZE COMPETITION.

£100

OFFERED
IN CASH PRIZES.

NEW CLASS FOR STEREOSCOPIC PRINTS.

CLASS I.

For Pictures taken with any of the Thornton-Pickard Cameras and Shutters, except "Focal Plane" and Stereoscopic.

First Prize of	..	..	£10
Second	"	..	£5
Third	"	..	£3
Six Prizes of £2 each			£12

£30

CLASS II.

For Pictures taken with the Thornton-Pickard

First Prize of	..	..	£10
Second	"	..	£5
Third	"	..	£3
Six Prizes of £2 each			£12

FOCAL PLANE SHUTTER.

£30

CLASS III.

For Pictures taken with any of the various patterns of the Thornton - Pickard Shutters, except "Focal Plane" and Stereoscopic.

First Prize of	..	..	£10
Second	"	..	£5
Third	"	..	£3
Six Prizes of £2 each			£12

£30

CLASS IV.

For Stereoscopic Pictures taken with the Thornton-Pickard Stereoscopic Shutter.

First Prize of	..	..	£5
Second	"	..	£3
Third	"	..	£2

£10

Total in Cash Prizes, £100.

Prizes are offered for Sets of Pictures and their Negatives, each set to contain three prints.

Complete Prospectus & Rules post free. Competition closes Oct. 1st, 1903.



Exposure 1/200th sec.

"CLAIMING A FOUL"—Ireland v. Wales, at Belfast, 1901.

W. E. TOPPING.

PRIZE PICTURE *Taken with a Thornton-Pickard Focal Plane Shutter.*

12 x 10 Enlargements of this picture can be supplied, unmounted 2/6 each or mounted on plate-sunk India tint mount. 3. 6.



Exposure 1 hour.

CANTERBURY CATHEDRAL.

Lieut. A. W. McCOMBIE.

PRIZE PICTURE

*Taken with a Thornton-Pickard "Ruby" Camera and
Time and Instantaneous Shutter.*

Showing the Advantage of the Rising Front,

WHAT OTHERS THINK

OF THE "RUBY" CAMERAS.

CARDIFF, 24/10/01.
I purchased a whole-plate "Ruby" Camera set a few weeks ago, and must say that I am more than satisfied with the splendid Camera. During my time in business I have had to do with a good number, but must say that my "Ruby" is far ahead of any others for simplicity and certainty. The rising front is a grand Improvement and has been of good service, enabling me to Photograph objects that would have been too high for any other Camera.

A. W. S.

NANTES, 24/12/01.
Your "Ruby" Camera and its lenses are calculated to satisfy the most exacting requirements of both professional and amateur photographers. It is perfect in construction and its good practical qualities make it a most attractive instrument to a lover of good Photography.

P. R.

OF THE TIME & INSTANTANEOUS SHUTTER.

HAMBURG, 4/5/02.
I may say the Shutter is simply perfection. The soft quick glide of the blind forms a striking contrast to the shaky, jerky roll of some imitation roller blind Shutters I have handled.

L. N., Jr.

WILLESDEN GREEN, N.W., 27/5/02.
I have used your Shutters for some seven years, but about two years ago I purchased a Roller Blind Shutter bearing the name of one of the most eminent scientific instrument makers in the country on the plea that it was "identical" with yours and lower in price. I could not have believed that an instrument constructed with such an accurate surface could have been so entirely unsatisfactory. I wish for your sake that all Camera users knew what a snare and delusion these imitations of your excellent Shutters are.

B. T. R.

OF THE FOCAL PLANE SHUTTER.

KINGSTOWN, CO., DUBLIN, 27/3/02.
I am greatly pleased with the Focal Plane Shutter and was soon able to grasp the explanations as to working. The Speed Regulator is wonderfully correct and satisfactory.

G. E. L.

OF THE "IMPERIAL" CAMERA.

MANCHESTER, 11/2/02.
The "Imperial" set is a well made and beautifully finished Camera and worthy of the reputation of your firm. There is nothing throughout the complete set that the most fastidious could find fault with.

H. G. T.

OF THE TIME EXPOSURE VALVE.

WILLESDEN GREEN, N.W., 27/5/02.
I should like to say how delighted I am with your clever Time Valve. I have been surprised to find how very accurate the Timing is.

G. S. R.

OF .

Thornton-Pickard Cameras & Shutters

THE "ROYAL RUBY."



Made in . .

Two Patterns:

DOUBLE

and . .

TRIPLE

EXTENSION.

SEE PRECEDING
PAGES FOR
DESCRIPTION.

THE . .
THORNTON-
PICKARD
Manufacturing
Co. Ltd.,
ALTRINCHAM

KING OF CAMERAS.

Jonathan Fallowfield,

CENTRAL ...
PHOTOGRAPHIC STORES,

146, Charing Cross Road,

Telegrams: "Fallowfield, London."
Telephone: "4443, Central."

London, W.

(Thirty-four Years at Lambeth.)



LARGE STOCK IN ALL DEPARTMENTS

OF...

Stand Cameras and Lenses,
Hand Cameras and Tripods,
Lenses of all descriptions.
Huge Stock of Mounts and Cards,
Dry Plates and Papers,
Chemicals and Sundries.



SEND FOR LISTS
AND
FULLER PARTICULARS.

SPECIAL ATTENTION GIVEN
TO
EXPORT ORDERS.

JONATHAN FALLOWFIELD, LONDON.

Fallowfield's ~ Annual

is now the accepted Text Book of the
Photographic Trade, and the most valu-
able Guide to all Professionals and
Amateurs.

Last Edition contained 888 Pages and 1637 Illustrations.

1/6 SENT (POST-FREE) ANYWHERE **1/6**.

Or can be procured through Dealers, Chemists or Booksellers.
(Foreign Stamps for Annual accepted from Abroad.)

EXPORT ORDERS are Promptly Executed, and only
Fresh and Reliable Goods are sent.

All Plates and Papers are specially wrapped and packed for these
Orders, to resist the effect of hot or damp climates.

Professionals, Dealers and Shippers should apply for my
Best Wholesale Terms.

FULL LISTS SENT ON RECEIPT OF POST-CARD.

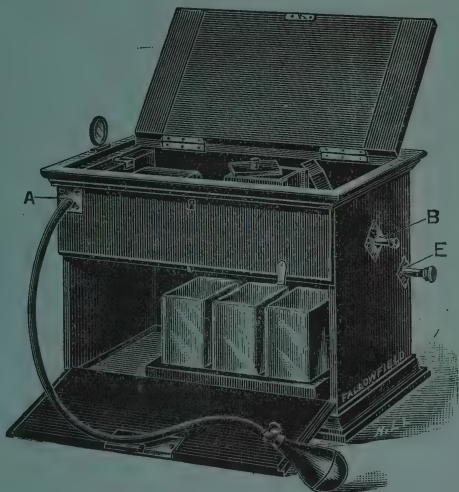
JONATHAN FALLOWFIELD, LONDON.

Self-Contained Automatic Camera

For Producing Victoria Size FERROTYPES on the
New DRY FERROTYPE PLATES.



Exact
Appearance
Ready
for Use.



Showing complete section of instrument

This Appliance is exceedingly ingenious, and after slight practice will be found to be easily manipulated. The whole arrangement is contained in a square handsome well-finished Mahogany Case, fitted with lock and key, and screw to attach to Tripod Stand. It weighs, when packed for travelling, 9 lbs., and measures over all when closed, $12\frac{3}{4} \times 8\frac{1}{2} \times 9\frac{1}{2}$ inches. The Camera is fitted with three glass baths for developing, washing and fixing; finder for centring subject; lens; receiver for plates; pneumatic release and cradle to hold plates in baths.

Apparatus, as above, complete....	£6 6 0
Sliding Leg Tripod Stand.....	0 17 6
	£7 3 6

Ferrotypes Dry Plates for this Camera.
L.N. Brand, in boxes containing 40 ea. $\frac{2}{3}$ per box
E.C. Brand, " " 100 ea. 6/0 "

Complete Ferrotypes List free on application.

JONATHAN FALLOWFIELD, LONDON.

The "Falloroll" Camera

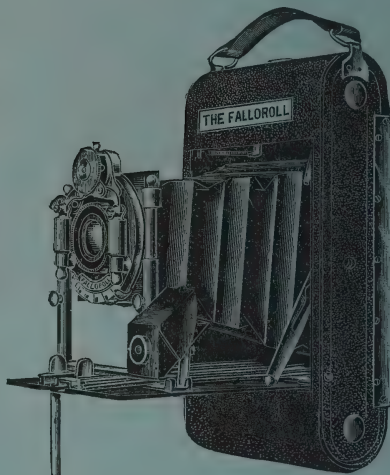
IS OF THE

**Best Folding Type and takes Plates or Films
(Daylight Loading).**

**Fitted with R.R. Lens F/8 "Unicum" Shutter,
Made by Bausch & Lomb.**

Rising and
Falling
Fronts fitted
for
Landscape
or Portrait
Views.

Has good
Reversible
Finder.



Can be fitted
to a
Tripod,
having both
Screw and
Bush with
each Camera.

Ball
and Tube
supplied.

If you have a lens and shutter you wish fitted, I shall be pleased to supply the Camera
for **Plates and Films**, but without lens or shutter for **63/0**.

"Falloroll" Camera for films only	70/0
"Falloroll," complete with focussing screen and one double plate holder	75/0

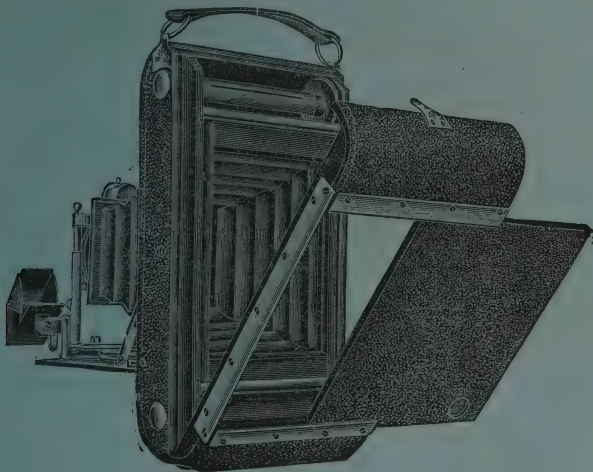
Extra Slides, 5/0 each.

JONATHAN FALLOWFIELD, LONDON.

"Falloroll" Camera

can be fitted with any maker's lens that may be suitable.
The following are kept in stock and are highly
recommended :—

Fallowfield's London-made Lens working at $f/6.8$	..	..	£6 17 6
Fallowfield's Ditto, ditto, $f/8$	..	..	5 5 0
"Cooke" Lens, Series III., 5 in., $f/6.5$	..	..	8 0 0
Goerz Lens, No. o, $f/6.8$, Series III.	..	..	9 0 0
Dallmeyer No. 1, $f/6$, Series III.	..	..	9 0 0



Best Leather Cases in Black or Brown at 7/6

Send for Lists and particulars.

JONATHAN FALLOWFIELD, LONDON.

The "Peritus" Camera.

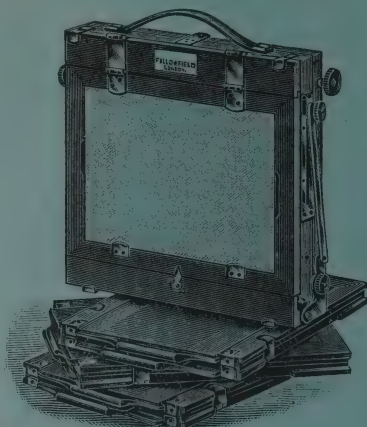
Made of the very finest
material.

Best Finish, every movement,

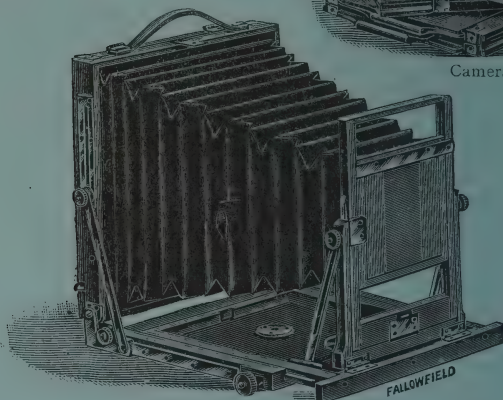
Long Extension,

Reversing Back.

Wide-Angle Movement.



Camera Folded.



Very light
and compact.

Half-plate
and
Three Double
Slides.

Weight:
3 lbs. 14½ ozs.
only.

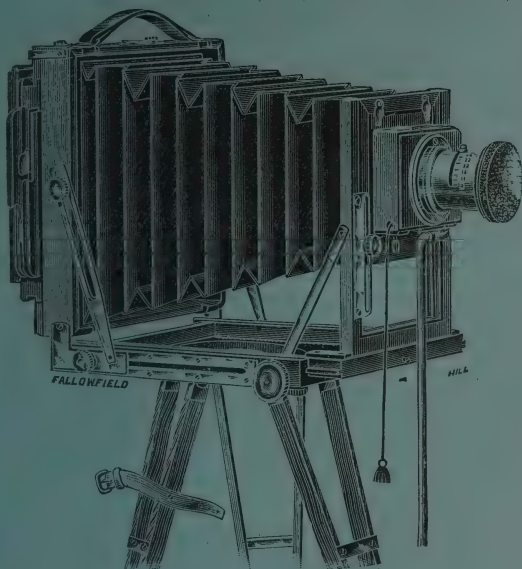
Camera fully open. Ready for use.

Size in Inches.	Price with three Double Slides.	Price List. Extra Double Slides.	Brass Binding. Extra.
4½ × 3½	£5 1 0	£0 13 0	£1 5 0
5 × 4	5 11 0	0 13 6	1 5 0
6½ × 4½	6 10 0	0 15 0	1 7 6
7½ × 5	7 0 0	0 18 0	1 7 6
8½ × 6½	8 0 0	1 0 0	1 10 0
10 × 8	9 13 0	1 4 0	1 17 6
12 × 10	11 8 0	1 10 0	2 0 0
15 × 12	13 15 0	2 0 0	2 10 0
20 × 16	22 7 0	3 12 0	3 15 0
24 × 20	26 12 0	3 16 0	4 5 0

Continental Sizes are supplied to order at the same prices as the nearest (larger)
English sizes. **Aluminium Binding** 25% extra on cost of Brass Binding.

JONATHAN FALLOWFIELD, LONDON.

70/0 Camera Sets.

Fallowfield's "Alacrity" Camera
Sets. 1903 Pattern.

This set, which has been very popular for two seasons, has been greatly improved and brought thoroughly up-to-date for the coming season. It is undoubtedly the very best value obtainable anywhere. The camera is London-made, of first-rate material. It is well finished and has long extension and every necessary movement. The Lens is a Rapid Rectilinear of good quality, working at $f/8$. The Shutter, which works behind the lens is of the "Roller-Blind" pattern, similar to the Thornton-Pickard.

The half-plate and whole-plate cameras are fitted with Turntables.

The Half-plate and Whole-plate Sets include Camera, fitted with Turntable, and one Double Dark Slide, Shutter, time and Instantaneous, and Speed Indicator, R.R. Lens and Three-fold Stand.

Prices.

Half-plate	£3 10 0	Whole-plate	£5 10 0
Or if fitted with Thornton-Pickard "Standard" Time and Instantaneous Behind-Lens Shutter, with Speed Indicator—			
Half-plate	£3 15 0	Whole-plate	£3 16 0
Cameras only are supplied in two larger sizes, with one slide each, but without lens, shutter, etc., at the following prices—			
Camera and one slide only, 10×8	£5 0 0	Ditto, 12×10	£6 6 0

Extra Double Slides.

Half-plate	8/0 each.	Whole-plate	15/0 each.
10×8	20/0 "	12×10	25/0 "

JONATHAN FALLOWFIELD, LONDON.

Improved Rapide Hand Cameras.

Tropical Rapide.

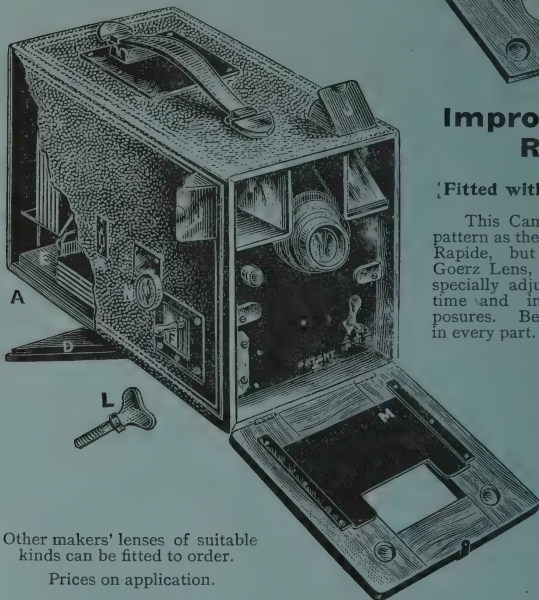
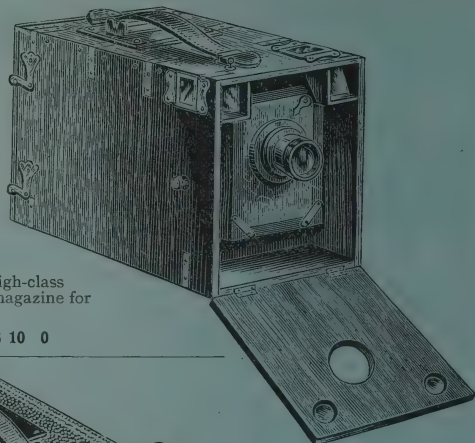
With Cooke
Focussing Lens with
special Shutter.

Body solid mahogany,
brass bound through-
out, supplied either
finished polished mahog-
any outside, or covered
in best morocco leather.

Outside measurement—
 $7\frac{1}{2} \times 5 \times 6$ inches.

A most compact, high-class
 $\frac{1}{4}$ -plate Camera, with magazine for
12 plates.

Price £8 10 0



Improved Rapide.

Fitted with Goerz Lens.

This Camera is the same
pattern as the No. 3 Improved
Rapide, but fitted with a
Goerz Lens, Series III., with
specially adjusted shutter for
time and instantaneous ex-
posures. Best workmanship
in every part.

Size over all—

$9 \times 5\frac{1}{2} \times 6\frac{1}{2}$ inches

Price—

£9 0 0

Other makers' lenses of suitable
kinds can be fitted to order.

Prices on application.

JONATHAN FALLOWFIELD, LONDON.

Jonathan Fallowfield,

146, Charing Cross Road,

LONDON, W.

The Central Photographic Stores.



In the large Stock Rooms at the above address I have the most reliable goods made by every well-known maker, and can supply any Camera to order.

State requirements, and I shall be glad to send full information, or to quote for both regular and special Cameras and Photographic Goods.

Cameras made to Order, and fitted with Lenses, Shutters, etc., according to Customer's instructions.

The following Cameras, among others, are stocked—

“Challenge,” “Express,” “Ensign,” “Alacrity,”
“Klito,” “Perceptus,” “Cyko,” “Premo,” “Miral,”
“Anschutz,” “Rapide,” “Premier,” “Falloroll,”
“Ray,” “Imperial,” “Frena,” “Victoria,” etc., etc.



Send **at once** a post-card for my huge Mount List, containing the largest and most up-to-date selection of Mounts (contained in one book) ever given away free of charge.
—(Vide Press.)

For Professionals, Amateurs and Shippers.

JONATHAN FALLOWFIELD, LONDON.

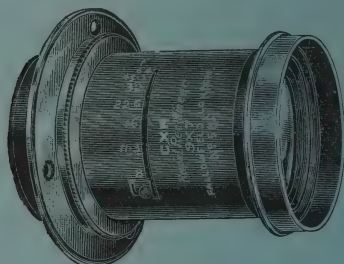
LENSES.

Fallowfield's R.R. Lenses

'C.X.R.' Series.

Every Lens of this Series is guaranteed equal to the very best.

Each Lens is engraved as per illustration below.



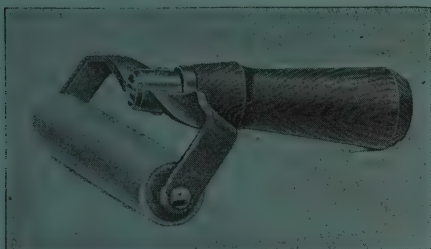
Supplied with Iris diaphragms only in the following sizes:—

5 × 4 or $\frac{1}{4}$ -plate	.. .. .	£2 5 0
7 × 5 or $\frac{1}{2}$ -plate	.. .. .	2 12 6
8 × 5 or $7\frac{1}{2} \times 5$ -plate	.. .. .	3 5 0
9 × 7 or $\frac{1}{1}$ -plate	.. .. .	3 17 6
10 × 8	.. .. .	5 0 0
12 × 10	.. .. .	5 15 0
15 × 12	.. .. .	7 15 0
20 × 15	.. .. .	11 5 0
24 × 20	.. .. .	28 10 0

If not approved of I will exchange any of the above lenses if returned in good condition within ten days from the date of purchase.

I supply lenses by all the very best makers. Full lists and particulars will be found in my ANNUAL, which I send post-free to any address for 1s. 6d.

JONATHAN FALLOWFIELD, LONDON.



New Roller Squeegee.

The "Jaynay" Patent.

The handle is of improved form, and the frame is attached to the handle by a patent fastener.

Extra strong and well finished.

PRICES—

4 in.	5 in.	6 in.	7 in.
9d.	10½d.	1/0	1/3
8 in.	9 in.	10 in.	12 in.
1/6	1/8	1/10	2/3
each.			

New Pattern Hinged Spring

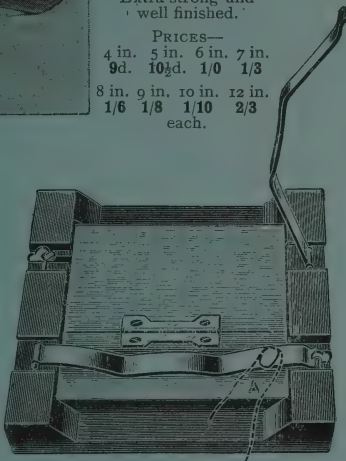
Printing Frames.

The catch, which has been greatly improved, is of solid metal. The spring is released by pressing it near the catch and pushing the catch away at the same time. The closing is automatic. The springs and catches are sunk, so that there are no projections to interfere with packing or storing the frames close together.

The frames are well made of seasoned teak, and are not liable to slip or break negatives.

PRICES—

	each.	per doz.		each.	per doz.
¼ plate ..	8d.	6/0	8½ × 6½ ..	2/3	24/0
5 × 4 ..	9d.	8/0	10 × 8 ..	3/0	32/0
6½ × 4½ ..	1/2	12/0	12 × 10 ..	3/6	40/0
15 × 12, 5/0 each; 57/0 per doz.					



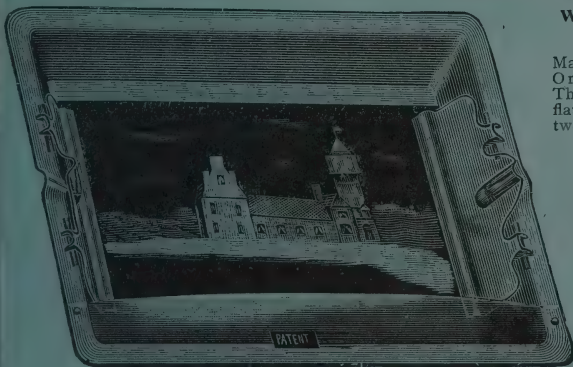
New Combination Film Developing Tray.

With Clips and Well.

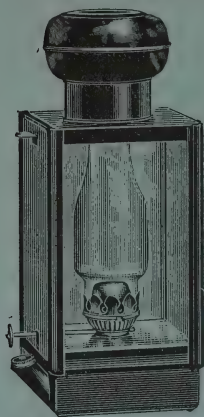
Made of Transparent Orange Celluloid. The films are kept flat by means of the two celluloid spring clips, and the progress of development, can be seen by holding the tray against the light; the solution remaining in the well.

PRICES—

¼ plate	1/7
5 × 4	1/11
¾ plate	2/3
Whole-plate,	3/6 each.



JONATHAN FALLOWFIELD, LONDON.

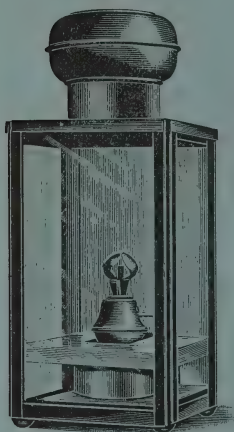


C.X.R. No. 5. 2/6.

NEW LAMPS for Dark-Room.

C.X.R., No. 5,
Square Lamp for
Oil, with Ruby
Glass, three
Slides, Glass
Sides, measure
6 in. \times 3 $\frac{3}{8}$ in.

Light adjusted
from outside.



C.X.R. No. 6. 2/0.

C.X.R., [No.
6, Square Lamp
for Oil, with
the Chimney-
less Burner,
Ruby Glass,
three Sides,
size 6 $\frac{1}{2}$ in. \times 3 $\frac{3}{8}$
in.

Light adjusted
from outside.



FOLDING POCKET LAMP.

Ruby Fabric with Metal
Framework and Solid Seam-
less Russian Iron Fittings
for top and bottom.

Size, when folded in box, 6 $\frac{1}{2}$ in. \times 3 $\frac{3}{8}$ in. \times $\frac{7}{8}$ in.

Price 6d.

Special Lights for above, 1/0 per dozen.



C.X.R. No. 7.

Square Metal, Japanned Body,
fitted with Vapour Lamp, adjust-
able from outside, and two Fabric
Screens, one yellow and one ruby.
Size over all, 6 in. \times 3 $\frac{3}{8}$ in. \times 3 in.

Price 1/6.



JONATHAN FALLOWFIELD, LONDON.

SPECIAL RETOUCHING DESK.

For
Professional
Photographers.

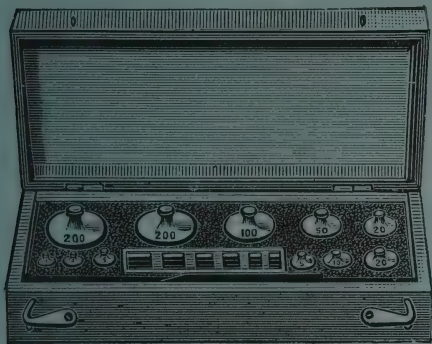
The "C.X.R."

A
Good Desk
at a
Reasonable
Price.



Well made of hard wood, with carriers for plates of all sizes from $\frac{1}{4}$ -plate to 12×10 , fitted with special adjusting struts, giving any angle required.

PRICE—Without Drawer, **10/6** With Drawer for pencils, etc., **17/6**.



GRAMME WEIGHTS.

**Finely Finished
and Accurate.**

In Polished Mahogany
Cases, with Forceps.
Fractions under plate-
glass cover.

100 grammes down to
1 milligramme .. **14/6**
50 grammes down to
1 milligramme .. **11/0**

CHEAPER SETS

of Gramme Weights
in Boxes.

Small size **2/0**
Large size **3/6**

JONATHAN FALLOWFIELD, LONDON.

Fallowfield's New Series of Mounts for Circular Pictures.

Stout Boards. With Rough Hand-made Paper Surface.
White, with Plate-Mark only.

Size of Board.	Size of P.M. circular.	Plain Edges. Per 100.	Deckled Edges. Per 100.
$3\frac{1}{2} \times 3\frac{1}{2}$	$1\frac{1}{4}$ in. diameter	3/0	4/0
$4\frac{1}{2} \times 4\frac{1}{2}$	$2\frac{1}{4}$..	4/0	5/6
5×5	3 ..	4/0	5/6
$5\frac{1}{2} \times 5\frac{1}{2}$	$3\frac{1}{4}$..	6/0	7/9
$6\frac{1}{2} \times 6\frac{1}{2}$	4 ..	7/6	8/6
7×5	$4\frac{3}{4}$..	7/6	8/6
9×9	6 ..	10/6	12/6
$5\frac{1}{2} \times 4\frac{1}{2}$	$2\frac{3}{4}$..	4/0	5/6
$6\frac{1}{2} \times 5\frac{1}{2}$	3 ..	6/0	7/9
$7\frac{1}{2} \times 6\frac{1}{2}$	$4\frac{1}{4}$..	7/6	8/6
$9 \times 6\frac{3}{4}$	$4\frac{3}{4}$..	9/0	12/6
11×9	6 ..	15/0	17/6

New 'Linen' Surface Plate-Mark Mounts.

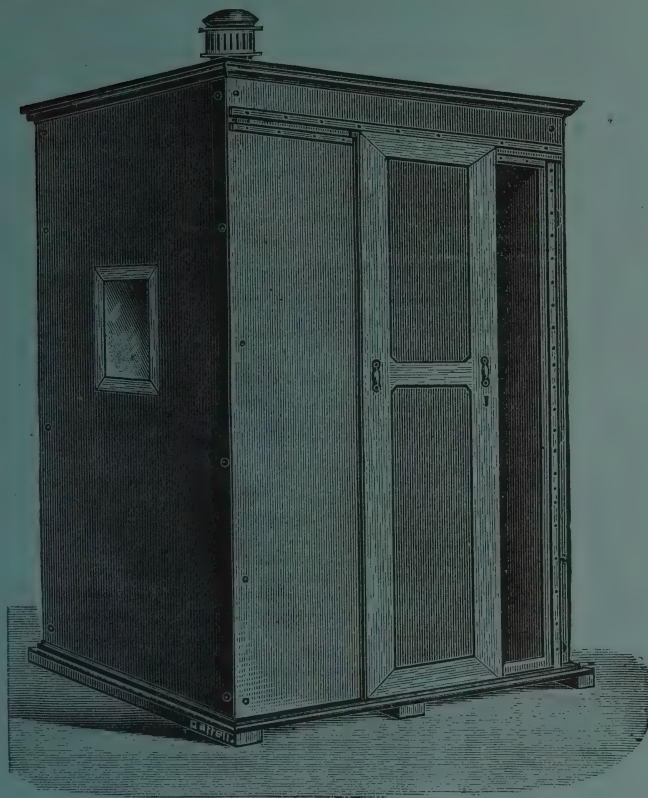
Fine White Card in two Styles. Style I. with Plain Plate-Mark.
Style II. with Paste-down Cream Tints.

No.	Size of Board.	Size of Centre.	Per 100. Style I.	Per 100. Style II.
02217	$4\frac{1}{2} \times 3$	$3 \times 1\frac{1}{4}$	2/6	3/0
02218	$6\frac{1}{2} \times 4\frac{3}{4}$	$4\frac{1}{2} \times 3$	3/6	4/0
02219	$7 \times 5\frac{1}{4}$	$4\frac{1}{2} \times 3\frac{1}{2}$	4/0	5/0
02221	$8\frac{1}{2} \times 6\frac{1}{2}$	5×4	5/6	6/6
02222	$9 \times 6\frac{3}{4}$	$6\frac{1}{2} \times 4\frac{1}{2}$	6/0	7/0
02223	$9\frac{1}{2} \times 8$	$6\frac{1}{2} \times 4\frac{3}{4}$	7/6	9/0
02223A	$10 \times 5\frac{1}{2}$	$6\frac{1}{2} \times 3\frac{3}{8}$	6/6	8/0
02224	10×8	7×5	7/0	8/6
02225	12×9	8×6	10/0	12/0
02226	12×10	9×7	12/0	14/0
02227	$14 \times 11\frac{1}{2}$	10×8	16/0	19/0
02228	15×12	$10\frac{1}{2} \times 8\frac{1}{2}$	17/0	20/0
02229	18×14	12×10	22/6	26/6
02229A	19×15	13×11	26/6	30/6
02230	4×4	2 in. circle	3/0	3/6
02231	6×6	3 ..	4/0	5/0
02232	7×7	4 ..	5/6	6/6
02233	7×7	$4\frac{1}{2}$..	5/6	6/6

Only Style I. kept in Stock.
Style II. can be supplied to order when required.

JONATHAN FALLOWFIELD, LONDON.

Fallowfield's 'C.X.R.' Dark-Room.



⌘ This Dark-Room is constructed of a special material which does not warp or shrink. All the parts are made to fit easily together without any tools being required. The joints are absolutely light-tight. The door is made to slide, so that a larger dark-room can be fitted up in a limited space than when the doors are hinged in the usual way.

Sizes.	Prices.	Indoor.	Outdoor.
6 ft. 6 in. × 4 ft. × 4 ft.	£5 15 0	£7 7 0	
6 ft. 6 in. × 4 ft. 6 in. × 4 ft.	6 15 0	8 8 0	
6 ft. 6 in. × 5 ft. × 4 ft.	7 7 0	10 10 0	
6 ft. 6 in. × 5 ft. × 4 ft. 6 in.	8 0 0	11 11 0	

Special Quotations for larger sizes.

JONATHAN FALLOWFIELD, LONDON.

SPECIAL SOLUTIONS, ETC.

Fallowfield's Hydroquinone Developer.

(One-Solution.) 5 ozs., Concentrated 1/3
 10 " " " 2/0

Fallowfield's (Two-Solution) Pyro-Soda Developer.

Two 10-oz. Bottles 1/6

Fallowfield's (Two-Soluton) Special Pyro Developer.

(Pyro and Ammonia.) Two 10-oz. Bottles 2/0

Fallowfield's (Two-Solution) Pyro-Potash Developer.

Two 10-oz. Bottles 2/0

Fallowfield's (One-Solution) Eikonogen Developer.

10-oz. Bottle, Concentrated 1/3

Fallowfield's Toning and Fixing Bath.

For P.O.P. of any make. Half-pint, 1/3. Pint, 2/3.

Fallowfield's 'P.O.P.' Mountant.

In Special Capped Bottles, 6d., 1/0 and 2/0 each.
 The best Mountant for P.O.P.

Fallowfield's One-Solution Metol-Hydroquinone Developer.

Specially suitable for Snap-shots.
 5-oz. Bottle, 1/3. 10-oz. Bottle, 2/0.

Fallowfield's Bromide Toning Bath.

Sample, 6d. 10-oz. 1/3. 20-oz. 2/3.

Developers of all kinds can be made up to **Customer's Own Formulæ** by experienced men, on the shortest notice, and at reasonable prices. Chemicals of the purest quality only used.

Special quotations for large quantities.

JONATHAN FALLOWFIELD, LONDON.

The Promptest House in the Trade

"Sarum" R.R. Lenses, with Waterhouse Stops. 5×4 , 20/-; 7×5 , 25/-; 9×7 , 40/-; 10×8 , 60/-; 12×10 , 80/-; also with Iris diaphragms, 5/- extra. Specimens taken with these Lenses free on application. **Wide-Angle R.R. Lenses**, same prices as Iris "Sarum." **"Sarum" Plate Sunk Mounts**, per 100, 8×6 , 4/-; 10×8 , 4/6; 12×10 , 6/-; 16×12 , 10/-; 18×14 , 16/-; 20×16 , 18/-; 25×19 , 24/- White tint on grey board and cream tint on white board. C.D.V., from 4/- 1,000; G.B.E. C.D.V.'s, 12/- 1,000; Cabinets, from 10/- 1,000; G.B.E. Cabinets, 22/6 1,000.

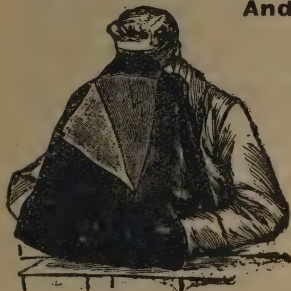
SPECIALITY—1,000 Cabinets, silver bevelled and silver blocked, 35/-

Orders printed and despatched the same day as received Samples free from

EDWARD PECK, Wholesale Photo-graphic Chemist, EAST DEREHAM, NORFOLK

THE POCKET CHANGING BAG

And Focussing Cloth (Patent)



IS perfectly light-tight and safe to use. It has an opening for the eyes, which is attached to a band of soft leather, that adapts itself exactly to the face, and is kept in position by two elastic straps that fasten behind the head. As there is no coloured glass or celluloid to look through, less than half the amount of light need be admitted than is necessary with any similar Bag. The nose and mouth being outside, the breathing is not interfered with.

— PRICES. —

HALF-PLATE, or for Small Hand Cameras, 7/6.

WHOLE-PLATE, or for Large Hand Cameras, 10/-
 12×10 , 15/-

THE TOURISTS' DEVELOPING TENT

IS made in polished mahogany with a metal drawer for sink, and the same eye-piece as the Changing Bag. Closed, it is 13 square by $3\frac{1}{2}$ deep, and will hold the plates and all requisites for development. It is the cheapest, most compact and convenient article of its kind.

IN USE. 26 IN. \times 12 \times 10

Patent.



Price £1 11s. 6d.

CLOSED

Of all Dealers, and from the Manufacturer—

12 IN. \times 13 \times 3

W. R. BAKER, 9, Belmont Road, WALLINGTON.

TO HELP YOU

**WE SELL EVERYTHING
AT LOWEST PRICES.**

**The
Cheapest**

**Photo
Stores**

**in
London.**

**CATALOGUE
POST FREE.**

J.P. "ARCHITECT" $\frac{1}{2}$ -plate Set.

Polished mahogany camera, black leather bellows, reversing and swing back, double extension, wide angle movement and rising front, brass turntable, r DD slide, book form, double hinged shutters, hinged metal division, spring catches; double achromatic rapid rectilinear lens, iris diaphragm; roller blind, T and I shutter, fitted behind lens, with speed indicator and pneumatic release; 3-fold ash stand, with rule joint and sliding legs.

Price 65/- Extra DD slides, 7/3 each.

THERE IS NOTHING LIKE IT AT THE PRICE.

J.P. "CLUB" Lantern.

Russian iron body, 4-inch condensers, stage and front tube and sliding O.G. tube, all of brass, and sliding forward to permit of chemical and physical experiments.

Price of lantern only in carrying case, £2 11s. 11d.

3-wick Russian Iron Lamps, best 7/11; cheaper 4/11.

4 " " " " " 10/7; " 6/6.

Stock's patent ditto, very powerful, 24/11.

Incandescent gas outfit, 7/11.

ACETYLENE & LIMELIGHT APPARATUS.

JOHN PIGGOTT, LTD.,

OPTICAL STORES,

117 & 118, Cheapside, and Milk St., LONDON, E.C.

SCIENTIFIC APPARATUS OF ANY DESCRIPTION SUPPLIED.

THIRTY-SEVEN MEDALS FOR PLATINOTYPE.

PLATINOTYPE PRINTING PLATINOTYPE ENLARGEMENTS

CAREFULLY EXECUTED BY

RICHARD KEENE, LTD.,

Dealers in Photographic Apparatus, Chemicals, &c.

DERBY.

PLATES AND FILMS DEVELOPED, PRINTED, MOUNTED.

CAMERAS,

Photographic Apparatus,

And every Photographic Requisite.

KODAKS and Materials always in stock.

Plates and Films Developed and Printed. Write for Lists.

New Catalogue, of over 200 pages and 200 Illustrations, post free.

Magic Lanterns,
Slides,
AND GAS.

Cinematographic
Exhibitions Given.

**JAMES BUNCLE, Optician (Late of 7, Hope Street),
93, SHANDWICK PLACE, EDINBURGH.**

INCREASE YOUR BUSINESS!

SEND TO

MYERS & FROST,

The Manchester Photo Enlarging Co.,

42, Oxford St., Manchester,

Telegraphic Address, "Enlarging, Manchester."

FOR PRICE

LIST OF

Enlargements

Established 35 Years.

This speaks for itself.

All our Goods sent on approval for a fortnight, if desired.

You set the one Scale, it does the rest!

WYNNE'S Patent INFALLIBLE EXPOSURE METER

AN unerring guide to the correct Exposure required for every speed of plate, on every kind of subject, and under every condition of light. For any set of conditions of LIGHT, PLATE, and LENS APERTURE, only two simple operations are necessary to find simultaneously the correct exposure for every stop from the largest to the smallest, viz. :—

FIRSTLY.—Turn the milled edge of the instrument, and thus expose through the slot a fresh surface of sensitive paper



until it assumes the colour of the painted tint, and note the number of seconds or minutes it takes to so colour.

This is called the ACTINOMETER TIME.

SECONDLY.—Set the movable scale until this ACTINOMETER TIME is against the F SPEED NUMBER OF THE PLATE to be used (see PlateSpeed List below), then against every stop in outer scale will be found the correct corresponding exposure, or, shortly, *you set the one Scale, it does the rest.*

Speed Numbers of a few makes of Plates. Full List supplied with Meter.

Paget XXX	Speed	f/78	Lumière Extra Rapid ...	Speed	f/111
Paget XX	"	f/56	Mawson's Electric ...	"	f/90
Blair Film	"	f/64	Cramer's Iso. Medium ...	"	f/78
Eastman Film	"	f/90	Seed's Extra Rapid ...	"	f/111
Ilford Empress	"	f/78	Wratten Ordinary ...	"	f/32
Imperial Special Rapid	"	f/111	Carbutt's Eclipse ...	"	f/64

The following examples illustrate the extreme simplicity of the Exposure Meter.

No. of Example	A Assumed Actinometer Time.	P Plate to be used. See List of Plate Speeds above.	S Stop to be Employed	E Correct Exposure for the three foregoing conditions.
No. 1	8 sec.	Paget Phoenix ... Speed f/56	f/32	3 sec.
" 2	3 sec.	Lumière Ex. Rapid ... f/111	f/56	$\frac{1}{15}$ sec.
" 3	6 min.	Eastman Film ... " f/90	f/16	$\frac{1}{2}$ min.
" 4	48 sec.	Cramer's Iso. Medium ... f/78	f/8	$\frac{1}{2}$ sec.
" 5	32 min.	Wratten Ordinary ... f/32	f/28	24 min.
" 6	16 sec.	Mawson Electric ... " f/90	f/7	$\frac{1}{15}$ sec.

To find the correct exposure in each of these examples, set Actinometer Time in column A against Plate Speed Number in column P, then against the stop to be employed in column S will be found the correct exposure in column E, and in each case the correct exposure will also be simultaneously shown against every other stop on the outer scale.

Send for particulars post free, with Reproductions of Photographs of difficult subjects, the exposures of which, varying from $\frac{1}{32}$ second to $1\frac{1}{2}$ hours, were (as certified) timed by the Meter, and the exposures made by persons who had never previously taken a photograph,

[See following pages.]

WYNNE'S Patent INFALLIBLE EXPOSURE METER

(Continued.)

J. COOK, Ramford Hotel, St. Helens.—“A child with one eye could not misjudge the matching of the tints now.”

W. FRANK CARTER, 106a, High Street, Oxford.—“A photographer without your Meter is like a ship without a compass.”

H. DATE, Hon. Sec., North-West London Photographic Society, London.—“We have forty members in this Society, and, I may add, quite thirty of them use your Meter.”

R. RAILSTON BROWN, Blenheim Terrace, Bridlington Quay.—"I should as soon think of going out to take photographs without your Meter as I should of going without a camera."

A. HENDERSON, 63, Finsbury Pavement, London, E.C.—“Have always found your Meter to give correct exposure, and it has thus saved its original cost in plates many times over.”

HOOKE & SONS, Dealers, Brighton.—"A customer tells us he has timed a Meter from fractions of a second to hours, in about 600 exposures, and has not had a single failure!"

CHARLES E. SEABORNE, Watcombe Hall, Torquay.—“I have used your Meter for three or four years, in all sorts of places and under all conditions of light, and in all cases have found its name correct—viz., ‘Infallible.’”

W. T. WILKINSON, Photo-mechanical Expert, Wakefield.—“ . . . I have never lost a plate where I have followed its reading . . . I have tried it in every conceivable way, and it has always been right.”

Price, in handsome solid Nickel Cases, with Patent Shutter ... **7/6 each.**

solid Silver (Hall Marked)	15/-
----------------------------	------

Spare Packets of Deadmatch Sensitive Paper...	6d.	..
---	-----	----	-----	------------	----

Extra Books of Instructions with Speed List of Plates	3d.	..
---	-----	-----	------------	----

New Glass and Dial, with correct standard Tints and Patent Shutter 10d. per pair.

Ditto, if old ones are returned	6d.
-------------------------------------	-----	-----	-----	-----	-----	-----

[illegible]

Improved Springs for inside of Meter	4d. each.
--------------------------------------	-----	-----	-----	-----	-----	-----------

Important Discovery *re* Sensitive Paper.

The Sensitive Paper generally used in Actinometers, when it becomes damp or deteriorated through long keeping, or is exposed in an exceedingly weak light, is liable to colour to a somewhat reddish tint, instead of to the bluish colour of the painted standard tint.

We have been for a long time conducting numerous experiments with a view of getting over this difficulty and producing a Sensitive Paper which would colour correctly whether wet or dry, or in a weak or strong light, and which would be quite unaffected by damp. We are exceedingly pleased to say that we have at last been completely successful in attaining our object, and only the new and perfected paper will hereafter be supplied. The paper on exposure colours under all conditions a dead match to the painted standard tints, and another advantage is that the quarter tint used when photographing Interiors is quite a different colour to the darker or standard tint.

The new standard tints, however, being entirely different to the old ones, we issue with each packet of Sensitive Paper two small correct standard tints, which can be gummed over the old tints, thus bringing the Meter up to date.

It must be obvious to you that the correct colouring of the paper under all circumstances to the standard tint is of vital importance, and that it is much more satisfactory to have a perfect paper of the kind we are now supplying than to use an incorrectly tinting paper, and then to try to rectify the discrepancy of colours by looking at them through a blue glass or other similar makeshifts.

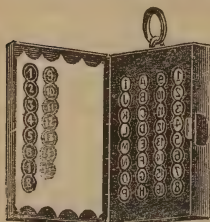
Our Exposure Meter has and needs only two scales, and with them gives the correct exposure for every stop simultaneously, whereas no other Meter at present on the market has less than four scales, and some considerably more than this.

THE INFALLIBLE EXPOSURE METER CO., WREXHAM.

[See preceding and following page]

Important to Professionals and Amateurs using the Carbon and Platinotype Process, and to Engineers using Sun Prints from Tracings.

WYNNE'S INFALLIBLE PRINT METER (Patent).



For automatically Indicating the Correct Exposure required for Printing Platinotype, Carbon, Engineers' Sun Prints, &c., with absolute accuracy and without any calculation whatever, and for testing the speed of Photographic Plates and Prints.

RULE.—Expose the Printing Frame and Print Meter at the same time, and to the same light, and when the Test Number in the Meter just appears readable the print will always be correctly exposed.

IN this simple rule is expressed all that is necessary to observe in order to ensure the absolutely correct exposure of Platinotype, Carbon, Engineers' Prints, or any other Printing Process requiring development to the leading professional photographers, who have expressed the highest approval both of its principle and effectiveness. **It undoubtedly marks the greatest advance yet made in instruments for timing the exposure of Developed Prints.**

"It would be difficult to design a more convenient apparatus."—*Photogram.*

"It may be safely said that for Platinotype or Carbon Printing, or in testing Plate Speeds, if the simple instructions and rules laid down are observed, it must fully justify its title of 'Infallible.'"—*Amateur Photographer.*

"The instrument is a tribute to the genius of Mr. Wynne, and fulfils its title of 'Infallible.'"—*Practical Photographer.*

In Handsome Nickel Cases, **6s.** each. **SENT ON APPROVAL.**
Extra Packets of Test Strips, **6d.** each. | Extra Books of Instruction, **2d.** each.
American Agency—THE INFALLIBLE EXPOSURE METER CO., 237, South Fourth Street, Brooklyn, New York. **Foreign Agents**—GERMANY, AUSTRIA and SWITZERLAND, Messrs. George Meyer & Kienast, Zurich; FRANCE, Mr. W. Kennigott, 64, Rue de Saintonge, Paris; RUSSIA, Mr. I. KARPOFF, St. Petersburg, Goods sent post paid to Dealers in other foreign countries where we are not represented.

INQUIRIES INVITED.

LIBERAL TERMS.

WYNNE'S INFALLIBLE LOCKET METER (PATENT).



We have much pleasure in introducing our new and Perfected Locket Meter, which, although less than 1 inch in diameter, is just as practical and efficient as our Standard Watch Pattern Meter. It is made in Solid Silver and 14-carat Rolled Gold Cases, beautifully chased and finished, and whilst it forms a handsome **Pendant** to a Watch Chain, is also a **perfect Exposure Meter.**

The rolled Gold Cases are of the very best quality and are quite indistinguishable from Solid Gold, and will with care last a lifetime.

PRICE IN SOLID SILVER **10/6** complete.

" **BEST QUALITY ROLLED GOLD** **15/-**

Spare Packets of Sensitive Paper, **6d.** each.

Solid Gold Meters to order only.

THE INFALLIBLE EXPOSURE METER CO., WREXHAM.

[See preceding pages.]

WHY PAY MORE?



Goes as far as any other, so is the cheapest in the world. The Gold is so combined with other salts that all the Gold is used in Toning, instead of half being useless and thrown away.

Send for a Tube and prove what we say is correct.

15 grains, 13/- doz. ; Single Tubes, 1/2 each.

HAND CAMERAS

for 12 $\frac{1}{4}$ -plate, 13/6 each.

This Camera is equal to any sold at £2 2s. It has a first-class Lens, Time and Instant Shutter, and Stops. The changing arrangement is most simple, and cannot get out of order.

STAND CAMERAS

with good Lenses, 5/6, 7/6, and 12/6 each.

"THE KING"

As the LION is amongst Beasts, so is this Camera amongst Cameras, "THE KING."

12 x 10, £7 17s. 6d.

If not approved, money returned.

"JOHN BULL" DRY PLATES.

Cheapest in the World. Send for List.

Cheapest House in the World for Photographic Materials.

All these Specialities are worth attention. The Amateur saves his money, the dealer increases his returns, the Shipper finds by sending out a sample order he soon gets large orders.

CITY OF LONDON PHOTOGRAPHIC STORES,

C. E. ELLIOTT, (Established 1855).

36, Jewin Street & 38, Jewin Crescent, London, E.C.

DAVID ALLAN,

Factory and Offices:

WHITFIELD WORKS,
MANSFIELD STREET,
KINGSLAND ROAD, N.E.

TELEGRAMS: "PULTACEOUS, LONDON."



Manufacturer of Photographic Requisites in Metal and Wood.

D. A. holds a large stock of the following articles:—

CAMERAS.

DARK SLIDES.

TRIPODS.

DARK ROOMS.

DEVELOPING SINKS.

DEVELOPING DISHES.

PRINT WASHERS.

PLATE WASHERS.

FIXING TANKS.

DRAINING RACKS.

PLATE BOXES.

PAPER TUBES.

50 PATTERNS OF
DARK-ROOM LAMPS.

All kinds of Special
work undertaken
In Metal and Wood.

DARK-ROOM LAMPS.

DARK ROOM LAMPS IN COPPER.

ELECTRIC DARK ROOM LAMPS.

LECTURE LAMPS.

FOLDING LAMPS.

GAS LAMPS.

BACKGROUNDS.

FOCUSSING CLOTHS.

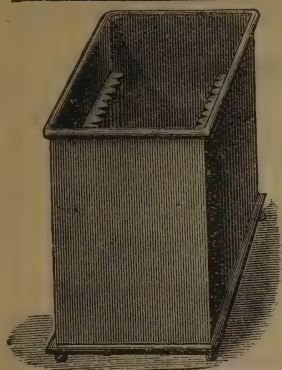
ISOCHROMATIC SCREENS.

ETC., ETC.

See following page.

PRICE LIST
and
TRADE

TERMS on
Application.



Lead Lined Tank for Fixing.

NOT CORRODED BY HYPO.

Unbreakable, does not break the
Negatives.

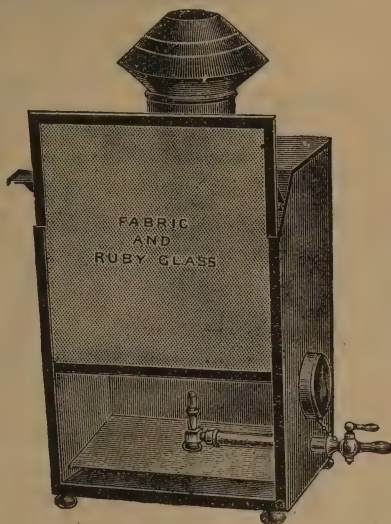
Stocked in all sizes up to 15 x 12.

Continental and other sizes made to order.



The Sloping Fronted Gas Lamp.

**Cheapest Lamp of
its kind.**



No. 1.	Size of glass 10 x 8 ..	...	...	...	5/3 each.
" 2.	" " 12 x 10 ..	...	...	...	10/- "
" 3.	Fitted with cap and side window ..	...	...	...	15/- "
	Size of front 15 x 12.				

Wholesale and Export only.

See preceding page.

SCHERING'S ACID PYROGALLIC

PUREST AND BEST.

Of world-wide fame.

Like fresh fallen snow.

Dr. VOGEL, after testing, stated **SCHERING'S PYRO** to be the
"QUICKEST and of GREATEST DENSITY-GIVING POWER."

SCHERING'S PHOTO- FORMALIN.

The safest and best hardener of the gelatine film. Prevents frilling, pitting, and stripping, and renders a negative impervious to damp. It may be used over and over again. For use, take 1 part to 9 parts of water.

4 ozs. ... 1/-

8 ozs. ... 1/9

16 ozs. ... 3/-

SCHERING'S ACID FIXING SALTS.

In Tins containing
4 ozs. (in $\frac{1}{4}$ oz. Tablets)
6d. per tin.

(Making 24 ozs. of Solution.)

The solution obtained from these salts answers admirably for the fixation of both plates and papers. The solution does not discolour so readily as the plain bath; it also eliminates from the film any stain due to the developer, and hardens the gelatine.

SCHERING'S PYRO-CRYST SNOW WHITE CRYSTALS.

Wholesale Agents—**A. & M. ZIMMERMANN,**

(Note new
Address)

3, Lloyd's Avenue, London, E.C.

LETO PRINT OUT**POSTCARDS.****(Collodio-Chloride Emulsion).**

LETO Postcards are printed out in the same way as ordinary P.O.P., and tone readily with any reliable toning bath, either separate or combined.

LETO Postcards are carefully manufactured (the very best Barytⁿ Paper only being used), and are unrivalled for beauty and brilliance of tone.

PACKETS CONTAINING

12 POSTCARDS and 2 MASKSPrice **10d.**

MATT OR GLOSSY.

Of all dealers.

SCHERING'S TONE-FIXING SALTS

(Containing Gold).

These Salts when dissolved in water produce an excellent Combined Toning and Fixing Bath, giving any Range of Tone.

These Salts are put up in $\frac{1}{4}$ -oz. Tablets, thus doing away with the necessity of dissolving the whole of the contents at once.

In 4-oz. Tins, making 32 oz. Solution, 1s. per Tin.

ADUROL-Schering

A new Developer yielding a soft, well graduated, and stainless image.

In Solid Form	..	2/- per ounce.
In Cartridge Form	..	2/6 per box of ten.
Concentrated Solution	...	Bottles, 1/- and 1/9.

SCHERING'S HYDROQUINONE.*Purest and Best.*

Wholesale Agents—**A. & M. ZIMMERMANN,**
 (Note New Address)
3, Lloyd's Avenue, London, E.C.

Any Photographer can take

PHOTOGRAPHS IN COLOURS

By the "Sanger Shepherd" process of Natural
Colour Photography.

SIMPLE.

EASY TO WORK.

RELIABLE.

All materials supplied ready for use.

SETS OF COLOUR FILTERS, FROM 15s.

Complete Outfits

25s., £2 10s., £8 14s.

The only process which has proved a practical
success in the hands of the amateur.

Write for booklets, or call and see the results
amateurs have produced by our process.

SANGER, SHEPHERD & Co.,

FACTORY AND OFFICES :

5, 6 & 7, Gray's Inn Passage, Red Lion St.,
HOLBORN, LONDON, W.C.

NOTE.—Gray's Inn Passage is the second turning on the right in Red Lion Street,
coming from Holborn.

The BEST Work cannot be done without a Light Filter.

LIGHT FILTERS OR SCREENS

FOR

Orthochromatic Photography,

In all sizes, ready for immediate use.

CAPS, CELLS, FITTINGS AND CASES,

In all sizes.

ORTHOCHROMATIC PLATES,

Quarter to 15 by 12, always in stock.

Prices of best make Standard Filters, Caps and Cases.

	Absolutus Filters.		Gilvus Filters.		Landscape Filters, 2, 4 or 6 times.		Best Make Black Bronzed Spring Cells.		Morocco Leather Velv't Lined Cases.
									In.
1½, 1¼, 1⅓, 1½, 1⅔	{ Square 10/-	...	10/-	...	7/6				
	{ Circular 12/6	...	12/6	...	8/6	...	2/-	...	1½ 1/3
2	{ Square 12/6	...	12/6	...	10/-				
	{ Circular 15/-	...	15/-	...	12/6	...	2/6	...	1½ 2/-
2½	{ Square 18/6	...	18/6	...	12/6				
	{ Circular 20/-	...	20/-	...	15/-	...	3/-	...	2, 2/6
3½	{ Square 25/-	...	25/-	...	15/-				
	{ Circular 30/-	...	30/-	...	20/-	...	4/-	...	2½, 3/-

CHEAP SERIES FROM 2/6.

Write for Illustrated Catalogues and Descriptive Booklets.

SANGER, SHEPHERD & CO.,

Manufacturers of Scientific Apparatus, Cameras and Stands, Rotating Sectors, Instruments for the Measurement of Light and Colour, Speed Determination, &c.

FACTORY AND OFFICES—

5, 6 & 7, GRAY'S INN PASSAGE,

Red Lion Street,

HOLBORN, LONDON, W.C.

"CELLULOID"

(Registered British Trade Mark.)

**The Original and only satisfactory CELLULOID for use in
Photography.**

For DAYLIGHT SPOOLS.

For CUT FILMS for NEGATIVES.

For TRANSPARENCIES.

For CARBON WORK.

Absolutely free from Acid or anything photographically deleterious.

Our productions have fifteen years' first-class reputation in the English market, and are universally the acknowledged standard of excellence.

"Celluloid" keeps flat for years.

For Frena Cameras and all Cut Film Cameras "CELLULOID" always works smoothly.

For Daylight Spools and Cinematograph Films "CELLULOID" is made in rolls of 300 feet, without join, in various thicknesses.

"CELLULOID" Roll Film is the only Film used for Daylight Spools and Cinematograph Films by

THE IMPERIAL DRY PLATE COMPANY.

THE EUROPEAN BLAIR CAMERA COMPANY.

ELLIOT & SONS, LIMITED.

AUSTIN EDWARDS, WARWICK.

FITCH & COMPANY, LONDON.

AND OTHERS.

.....
Ask your Dealer for "CELLULOID" Films and see they are of our Manufacture; if in doubt send us a small cutting and we will advise by return.

THE CELLULOID COMPANY, NEW YORK, U.S.A.

Sole Selling Agents:

S. GUITERMAN & CO., LIMITED,

35 & 36, ALDERMANBURY, LONDON, E.C.

"TEXODERM."

(Registered British Trade Mark.)

The Best Covering for Hand Cameras.

Waterproof ! Indestructible !

Will outlast any leather covering twice over. Does not stain or lose its colour.

**In rolls of 50 yards, in various weights
for all trades.**

SAMPLES FREE ON APPLICATION.

Its hard-wearing qualities specially recommend it for Studio Photo Frames and Albums as well as for any use to which leather is now put.

Sole Selling Agents :

S. GUITERMAN & COMPANY, LIMITED,

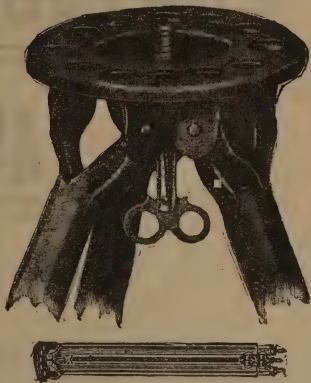
35 & 36, ALDERMANBURY, LONDON, E.C.

THE

"PERFECTO" NICKELLED STEEL TRIPOD.

The "Perfecto" Steel Tripod combines extreme strength and rigidity with light weight, beauty, and compactness. The "Perfecto" has no wooden parts to warp, no screws to become loosened, no shellac to become sticky as in wooden tripods, and being fitted with an **Adjustable Head** (see cut) the Camera may instantly be clamped in any required position without moving the tripod legs. The "Perfecto" will not dent like other metal tripods, is incomparably stronger, much more rigid, and is quite equal in appearance. The "Perfecto" is absolutely the **Strongest, Neatest and Cheapest** Tripod on the market. The "Perfecto" Camera Stand is suitable for **Field, Hand, or Folding Hand Cameras.**

*If this Almanac is mentioned, one
will be sent on Approval.*



Weight, 26 ozs. Length when folded $20\frac{1}{2}$ in.
Height when open, $55\frac{1}{2}$ in.

Price **12/6** of all
Dealers.

A. ROSENBERG & Co.,

21, Southampton Row,
Holborn, London, W.C.

Telegraphic Address: "Purgament" London.

Telephone No. 2411 Gerrard.

SANDS, HUNTER & CO.,

20, Cranbourne Street, Charing Cross Road,

LONDON.

Close to the Hippodrome.



SECOND-HAND

PHOTOGRAPHIC

APPARATUS.



ESTABLISHED OVER 20 YEARS.

Price List sent Post Free on Application,
Apparatus sent on Approval (see Catalogue),
Cameras and Lenses taken in Exchange,

1888, PRIZE MEDAL FOR EXCELLENCE OF APPARATUS.



SHARP & HITCHMOUGH

Photographic Instrument Makers,

GOVERNMENT CONTRACTORS,

101 & 103, DALE STREET, LIVERPOOL.

Works and Warehouse: Gresham Buildings.

Specialities for Home and Export:

CAMERAS, LENSES, STANDS,
 DRY PLATES, CHEMICALS,
 CARDS, MOUNTS,
 FRAMES AND SUNDRIES,
 OPTICAL GOODS,
 SCIENTIFIC APPARATUS FOR
 HOME AND EXPORT.

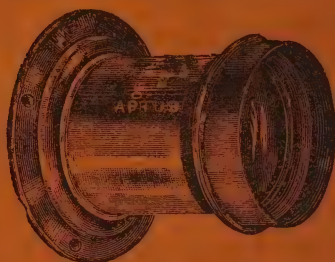
MECHANICAL WORK UNDER-
 TAKEN.
 INVENTIONS WORKED OUT
 FOR
 AMATEUR MECHANICS.
 PHOTOGRAPHIC PRINTING AND
 ENLARGING.

This List is subject to fluctuations of the Market.

Special Quotations to large buyers. Foreign Indents should
 be addressed to

SHARP & HITCHMOUGH, Liverpool,

APLANATIC DOUBLET.



Guaranteed Quality.

ADMIRABLY ADAPTED FOR
GROUPS, LANDSCAPES,
ARCHITECTURE, COPYING,
ENLARGING, and
INSTANTANEOUS WORK.

PRICES. TTT

Diameter of Lens.	Approximate Equiv. Focus.	Iris Diaphragm.
1 inch { $4\frac{1}{4} \times 3\frac{1}{4}$ $5\frac{1}{2}$ in. £1 1 0
1 $\frac{1}{2}$ " { & 5×4 $8\frac{1}{2}$ in. 1 5 0		
1 $\frac{3}{4}$ " { $6\frac{1}{4} \times 4\frac{3}{4}$ $12\frac{1}{4}$ in. 1 15 0		
1 $\frac{1}{2}$ " { $8\frac{1}{2} \times 6\frac{1}{2}$		

LENS CAPS.

1 in.	1 $\frac{1}{2}$ in.	1 $\frac{3}{4}$ in.	1 $\frac{3}{8}$ in.	1 $\frac{1}{2}$ in.	1 $\frac{3}{8}$ in.	1 $\frac{1}{4}$ in.	1 $\frac{3}{8}$ in.	2 in.	2 $\frac{1}{2}$ in.	2 $\frac{1}{4}$ in.	2 $\frac{3}{8}$ in.
Ea.	4d.	5d.	6d.	7d.	8d.	9d.					
One Dozen Assorted										5/9	TTT

"APTUS" RAPID RECTILINEAR LENSES.

From Mr. J. FINNIE, Callander, Photographer. With Adjustable Diaphragms
"I have given the Lens (Euryscope) fair trial and find it just PERFECTION."

From Mr. H. CONWAY, Rhyl, N.W.

"I like the Lens (Aplanatic Doublet) you sent me very well indeed. I will order large R.R. from you shortly."

From Mr. J. BURGOWNE, Birmingham.

"I have one of your Lenses in regular use, and a better Lens could not be."

We are constantly receiving letters expressing satisfaction at the quality of our Lenses.

RAPID RECTILINEAR.

PRICES.

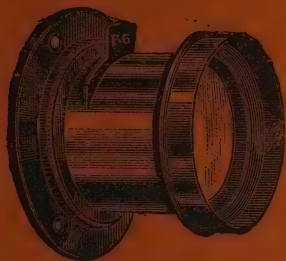
Size. covered	Dia. meter.	Focus.	Water- house.	Iris Dphrgms.	Size. covered.	Dia. meter.	Focus.	Water- house.	Iris Dphrgms.
5 x 4	1 $\frac{1}{8}$	4 $\frac{1}{2}$ in.	£1 8 0	£1 14 0	10 x 8	2 $\frac{1}{8}$	12 $\frac{1}{2}$ in.	£3 10 0	£4 0 0
7 x 5	1 $\frac{1}{4}$	7 $\frac{1}{2}$ in.	1 12 0	2 0 0	12 x 10	2 $\frac{3}{8}$	14 $\frac{1}{2}$ in.	5 0 0	5 15 0
8 $\frac{1}{2}$ x 6 $\frac{1}{2}$	1 $\frac{3}{8}$	10 $\frac{1}{2}$ in.	2 10 0	3 0 0	15 x 12	2 $\frac{7}{8}$	15 $\frac{1}{2}$ in.	6 12 0	7 18 0



SHARP & HITCHMOUGH'S "APTUS" EURYSCOPE, or R.R. PORTRAIT SERIES.

THE Lenses are of special optical glass, and have about twice the rapidity of the Rapid Rectilinear Series, working $f/6$, specially good Lenses for Portrait work in Studio, or Groups in the open air; they are equally good for Landscape or Architectural work with smaller stops.

TTT



Size covered.	Focus.	Diameter.	I.	Iris.
			£ s. d.	£ s. d.
5×4	4 $\frac{3}{4}$ in.	1 $\frac{1}{2}$	1 13 0	2 0 0
7×5	8 $\frac{1}{4}$ in.	1 $\frac{1}{2}$	2 5 0	2 14 0
9×7	10 $\frac{1}{2}$ in.	2	3 18 0	4 10 0
10×8	12 $\frac{1}{4}$ in.	2 $\frac{1}{2}$	7 10 0	8 10 0

THE "ALDIS" LENS

English made, giving fine definition at $f/6$.

SERIES II. $F/8$.

TTT

No.	Approximate equivalent focal lengths.	Distance from shoulder of flange to screen when set for distant objects.	Recommended for plates.	Largest plate covered with small stop.	Price mounted in "Bausch & Lomb" shutter.	Price of fitting to Customer's own "Unicum" shutter.
	in.	in.	in. in.	in. in.	£ s. d.	£ s. d.
1	5	4.2	3 $\frac{1}{2}$ ×3 $\frac{1}{4}$	8×5	4 7 6	3 0 0
2	5 $\frac{1}{2}$	4.9	4 $\frac{1}{4}$ ×3 $\frac{1}{2}$	8×7	4 17 6	3 10 0
3	7 $\frac{1}{2}$	6.1	5×4	11×9	6 12 6	4 15 0
4	8 $\frac{1}{2}$	7.2	6 $\frac{1}{2}$ ×4 $\frac{1}{2}$	13×11	7 17 6	5 5 0



Terms—Strictly nett cash with order.
Forwarded free of charge to any part of the United Kingdom.

THE FINEST LENS FOR HAND CAMERAS.

See pages 1369, 1373 for the "Aptus" Magazine Hand Camera.

"It were convenient you had such."—*Titus Andronicus*.

"APTUS" WIDE-ANGLE DOUBLET RECTILINEAR, REVOLVING DIAPHRAGMS.

Specially adapted for Architecture; being of short focus and wide angular aperture, can be used to advantage when very close to the subject. It is also useful for landscapes as well as copying. The smaller ones give beautiful **Lantern Slides**, the definition being exceptionally crisp. TTT

Size.	Focus.	Diam. of Lens.	£.	s.	d.
$4\frac{1}{4} \times 3\frac{1}{4}$ in...	$2\frac{3}{4}$ in. ...	1 in. ...	1	10	0
$6\frac{1}{2} \times 4\frac{1}{4}$ in...	$4\frac{5}{16}$ in. ...	$1\frac{5}{16}$ in. ...	1	17	0
$8\frac{1}{2} \times 6\frac{1}{2}$ in...	$6\frac{1}{4}$ in. ...	$1\frac{9}{16}$ in. ...	2	15	0
10 × 8 in. ...	7 in. ...	$1\frac{11}{16}$ in. ...	4	10	0
12 × 10 in. ...	8 in. ...	$1\frac{15}{16}$ in. ...	6	0	0

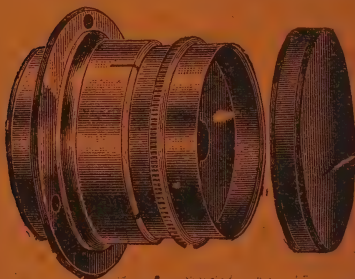
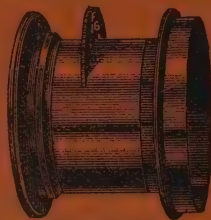


Fig. 1.

TTT

The Same as Above,
MOUNTED AS FIG. 2, with
rotating stops.

	Fixed Mount.	Sliding Mount.
Quarter-plate ...	6/9	7/6
Half plate ...	11/3	12/9

If fitted with Iris-diaphragm,

Quarter-plate ...	8/3
Half-plate ...	14/3

"APTUS" TTT SNAP-SHOT LENS.

5 inch Focus, mounted as Fig. 1, sliding mount, fixed-diaphragm for Quarter-plate, giving wonderful definition,

— 4/6 —

Half-plate 9/-

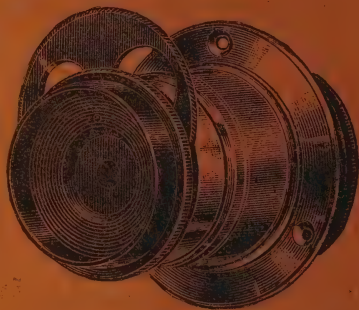


Fig. 2.

Will Clients abroad please address all Indents to

SHARP & HITCHMOUCH, LIVERPOOL.

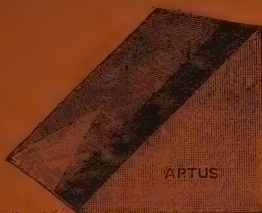
**TTT PRISMS.**

(Silvered.)

1½ in.	2 in.	2½ in.
30/0	36/0	43/0
3 in.	3½ in.	4 in.
53/6	66/0	96/0

Mounting specially to suit
own Lens extra—

13/6	16/0	17/6
20/0	25/0	30/0

Process and Half-tone Plates
in Stock.**"APTUS" QUICK-ACTING PORTRAIT LENSES,**

Specially adapted for Studio work, and at reasonable prices. These Lenses we thoroughly guarantee as being made of the finest English Glass, and are thoroughly tested before leaving our premises, notwithstanding which we give our customers the privilege of a three days' trial, and should the Lens be found to be unsatisfactory we undertake to return the money.

PORTRAIT LENSES, "Extra Rapid." TT

CARTE-DE-VISITE. Largest Aperture, F/3.

- 1 B.—Diameter of Lens, 1½ in.; Focus, 4½ in.; size covered, 4½ × 3½ in. **22 0 0**
Distance from subject for full-length Carte-de-Visite, 12 ft.
- 1 B Long.—Diam. of Lens, 2½ in.; Focus, 4½ in.; size covered, 4½ × 3½ in. **3 0 0**
Distance from subject for full-length Carte-de-Visite, 15 ft.

SINGLE ACHROMATIC LENSES TTT

For Stamp and Victoria Cameras, 1½ in. focus to 4 in. focus, **2/6** each. Mounted in sets, with diaphragm, at **3/0** each inclusive.



Fig. 3

HAND CAMERA LENSES. TTT

5 or 6-in. Focus Achromatic Jena Glass. Exceptional Quality for Quarter-plate Pictures. Wonderful definition, with large aperture.

UNMOUNTED, **2/6**. MOUNTED IN CELL, AS FIG. 3, **3/6**.
Postage 2d. extra.

SHARP & HITCHMOUGH, LIVERPOOL

"Aptus" Supplementary Lenses.



Taken with the ordinary Lens.

The Wide-angle Series
Is intended for use when taking interiors of buildings or for copying engravings, &c.; this allows a greater angle of view to be obtained at a given distance from the object, i.e., to fill the plate with a larger amount of view in confined spaces. NOTE.—Focus the image with the W. A. Lens fixed, and stop down to obtain the desired definition. Angle of view about ONE-THIRD GREATER.

A NEW SERIES OF
Achromatic Supplementary Lenses

OF
HIGH QUALITY

In course of preparation.



Taken with the Wide-angle Attachment.
See following page.

The APTUS Supplementary Lenses



Taken with the ordinary Lens.



Taken with the Portrait attachment.

The Portrait Series

Is intended for use when the extension of bellows of camera is not great enough to enable, say, a head and shoulders to be obtained at a given distance from the sitter; it also enlarges the image on the ground glass for near objects.

ONE-THIRD.

NOTE. — Focus the image with the Portrait Lens fixed, and stop down to obtain the desired definition.

Please Note. — To fit the supplementary Lenses to the hood of your Lens it is necessary to bend the springs outward, of course if required.

The addition of the Supplementary Lenses either lengthen the focus of Lens (about one-third) as in the case of the Tele-photo, or shorten the focus, as with the portrait and Wide-angle series, therefore a Camera with a focussing adjustment is necessary.

Also Wide Angle for Interiors, &c.

PRICES.

Tele-photo.	The Portrait.	Wide-Angle.	TTT
To fit inside Hood of R.R. Lens $1\frac{1}{2}$ in. to $1\frac{3}{4}$ in. diameter	2/6 each.
" " " " " " " "	3/6 "
" " " " " " " "	4/6 "
Sets of three in handsome case	...	7/6, 10/6 and 13/6	

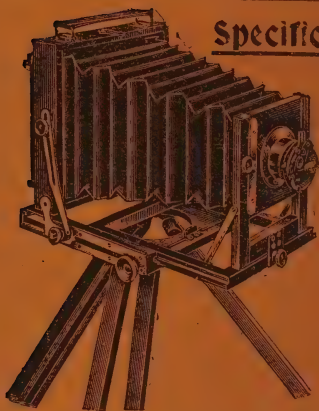
WHOLESALE FROM

SHARP & HITCHMOUGH, LIVERPOOL.

STAND CAMERAS

"MIDGET" OUTFIT.

Complete, **35/-** Postage, **6d.**



Specification:—

TTT

Camera.— $\frac{1}{4}$ -plate Mahogany polished, Leather Bellows Reversing and Swing Back, Rack and Pinion, Double Extension, body slides forward for W. A. Lens, Rising Front, Revolving Turntable

Dark Slide.— Mahogany polished, book form, double-hinged Shutters, and spring snaps.

Lens.—Achromatic Meniscus, giving fine definition, in highly-finished Brass Mount. Time and Instantaneous Shutter.

Tripod.—Well-made 3-fold and Sliding-legs Stand with Leather Straps.

Extras.—Double Slides, **4/6** each. Waterproof Case, **2/6** each, for Camera and one Slide. Waterproof Case for Tripod, **3/-**. Focussing Cloth, **2/-**.

Note.

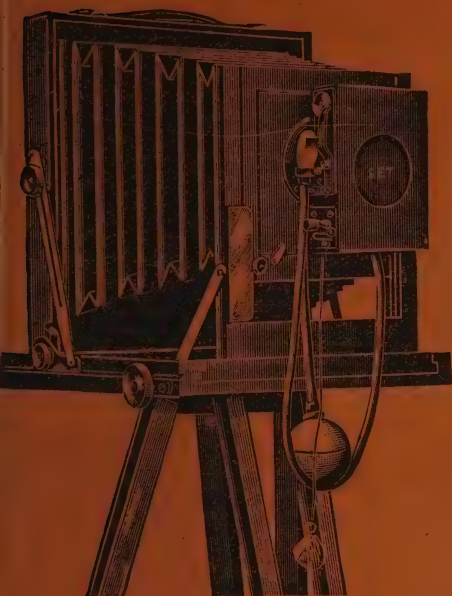


Will FOREIGN BUYERS please address all Indents to Sharp & Hitchmough when "Aptus" Goods are required.

SHARP & HITCHMOUGH, LIVERPOOL.

Telegrams: "APTUS FINDER, LIVERPOOL." Telephone—2495.

STAND CAMERAS.



TTT No. 6a OUTFIT.

COMPLETE.

$\frac{1}{4}$ -plate, 49/6; postage, 6d.

$\frac{1}{2}$ " 67/6; " 9d.

$\frac{1}{1}$ " 95/6; " 1s.

Specification.

Camera.—Mahogany polished, thoroughly well made, good leather bellows, reversing and swing back, back moves forward for use with W. A. lenses, rising front upon which shutter is fitted, turntable fitted in base.

Dark Slide.—Mahogany polished, "A" quality shutters, being double rabbeted, and hinged joints having spring catches.

Lens.—Rapid rectilinear, double achromatic, good quality, iris diaphragms.

Shutter.—The "APTUS" Time and Instantaneous, roller blind, speed indicator, pneumatic release.

Stand.—3-fold polished ash, fitted to turntable.

EXTRAS—

	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{1}{1}$
Double Dark Slides ... each	5/6	7/3	13/6
Stiff Waterproof Canvas Case, Lock and key, for camera and 3 slides	10/6	15/-	18/-
Case for Tripod	3/9	3/9	3/9
Focussing Cloth	3/-	3/3	3/9

Camera and Slide only (with turntable) $\frac{1}{4}$ -pl., 17/3 $\frac{1}{2}$ -pl., 33/6 $\frac{1}{1}$ -pl., 50/6

T. and I. Blind Shutters ... " 11/9 " 12/9 " 18/-

R. R. Lens, Iris ... " 11/9 " 12/9 " 18/-

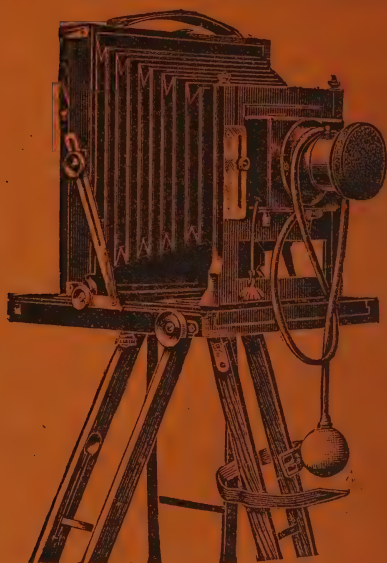
Tripod, three-fold Sliding leg ... " 9/- " 9/- " 9/-

THE BEST VALUE EVER OFFERED.

—WHOLESALE FROM—

SHARP & HITCHMOUGH, LIVERPOOL.

STAND CAMERAS.



No. 1a OUTFIT,

COMPLETE.

$\frac{1}{4}$ -plate, 58 6; postage, 6d.
 $\frac{1}{2}$ „ 74 9; „ 9d.
 $\frac{1}{1}$ „ 105 6; „ 1s.

Specification.

Camera.—Mahogany polished, specially selected, every possible movement, very light, fitted with turntable in base.

Dark Slide—Mahogany polished, best quality, very thin.

Lens.—Rapid Rectilinear, iris diaphragm.

Shutter.—The “APTUS” Time and Instantaneous, with speed indicator fitted behind the lens, pneumatic release.

Stand—3-fold ash, rule joint, with straps, fitting turntable.

	$\frac{1}{4}$ -plate.	$\frac{1}{2}$ -plate.	$\frac{1}{1}$ -plate.
Camera and Slide only (with turntable) ...	26 8	40 6	60 6
T. and I. Blind Shutter ...	11/9	12/9	18 -
R.R. Lens, Iris diaphragm ...	11/9	12/9	18 -
Three-fold Tripod, Sliding leg ...	9/-	9/-	9/-

EXTRAS—

Double Dark Slides ... each	6/6	8/2	14/3
Stiff Waterproof Canvas Case, with Lock and Key and Strap, for Camera and Three Slides ...	10/6	15/-	18/-
Case for Tripod ...	3/9	3/9	3/9
Focussing Cloth ...	3/-	3/8	4/10

Special quotations for 10 × 8, 12 × 10, and 15 × 12.

WHOLESALE FROM—

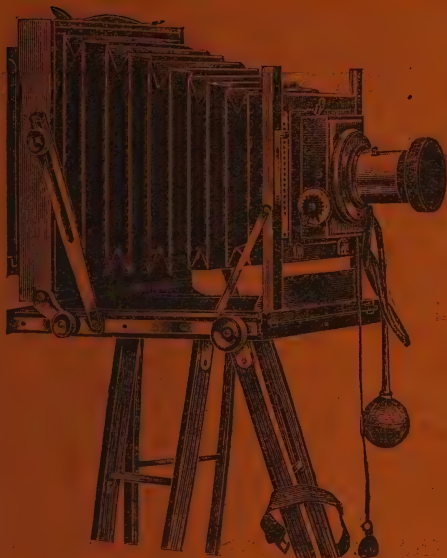
SHARP & HITCHMOUGH, LIVERPOOL.

In remitting, kindly inclose stamps for parcel postage—on light goods this is cheaper than by railway.

"The very best that e'er I saw."—*Midsummer Night's Dream.*

STAND CAMERAS.

Brass Bound No. 1a Outfit Complete.



$\frac{1}{2}$ -plate	£3 12 0	postage 6d.
$\frac{3}{4}$ "	5 3 6	" 9d.
1 "	6 19 6	" 1/-
$1\frac{1}{8}$ "	10 6 3	" 1/3
$1\frac{1}{2}$ "	13 3 4	" 2/3
$1\frac{3}{4}$ "	16 16 9	" 3/9

Specification. III

Camera.—Mahogany polished, thoroughly substantially made, with best leather bellows, reversing and swing back, rising front, back moves forward for use with wide-angle lens, complete with extra front, fitted with turntable up to $\frac{1}{2}$ -plate.

Dark Slide.—Mahogany polished, first quality, with hinged partition, and spring catches.

Lens.—Rapid Rectilinear, double achromatic, iris diaphragms, "The Aptus."

Shutter.—The "Aptus" Time and Instantaneous, roller blind, and speed indicator, pneumatic release.

Tripod.—2-fold ash, rule joint, with cloth-covered top, very substantial.

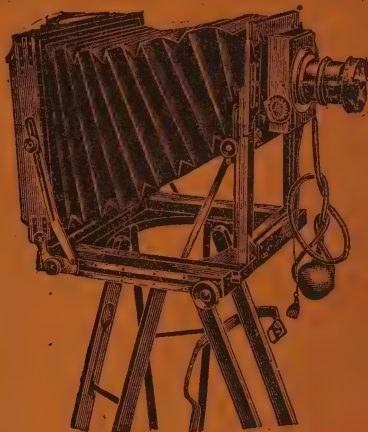
	$\frac{1}{2}$ -plate.	$\frac{3}{4}$ -plate.	1-plate.	10 X 8.	12 X 10.	15 X 12.
Camera and 1 Slide only	£1 13 6	£2 12 3	£3 14 0	£5 8 0	£6 6 0	£7 15 0
T. & I. Blind Shutter	11/9	12/9	18/-	21/9	29/6	34/3
Folding Tripod	9/-	11/9	11/9	13/6	18/-	21/9
R.R. Lens, Iris diaph.	18/-	£1 0 3	£1 16 0	£3 18 0	£4 10 0	£6 6 0

EXTRAS.

Double Dark Slides, B.B. each	7/9	12/6	18/9	27/-	35/6	48/-
Stiff Waterproof Canvas Case, Lock and Key, and Strap for Camera and 3 Slides	10/6	15/-	18/-	21/-	27/-	35/-

Will foreign buyers when ordering through merchants please mention that "Aptus" goods are required, to be obtained from SHARP & HITCHMOUGH, Manufacturers, Liverpool.

"APTUS" No. 1a PATENT BRASS-BOUND FIELD CAMERA.



Specification :

Camera.—Mahogany, French polished, thoroughly well made, extremely light and portable, $\frac{1}{4}$ -plate, only measuring when closed $8\frac{1}{2}$ in. \times $8\frac{1}{2}$ in. \times $2\frac{1}{2}$ in. over all, and having 17 in. extension with shutter fixed. Reversing back for vertical and horizontal work; swing back; rising front, with extreme movement, and having patent twisted pinion and diagonal cut rack, thus preventing slip after focussing. The great extension permits of a Tele-Photo Lens being used, and the double pinion fitted to the whole-plate allows the body to be moved forward for use with a Wide-angle Lens. The Camera is very perfectly constructed on the most modern lines, and is fitted with turntable, and handsomely brass bound to give strength.

Dark Slide.—Mahogany polished, first quality, with hinged partition, and spring catches.

Lens.—Rapid Rectilinear, double achromatic, iris diaphragms, "The Aptus."

Shutter.—The "APTUS" Time and Instantaneous, roller blind, and speed indicator, pneumatic release.

Tripod.—3-fold ash, sliding legs. TTT

OUTFIT COMPLETE, as described.

Half-plate . . £5 15 9 Postage 9d.

Whole-plate 7 15 9 „ 1s.

Other sizes quoted for specially.

Ebony binding may be had in lieu of Brass if preferred.

THE SETS MAY BE SPLIT UP AS FOLLOWS :

	$\frac{3}{4}$ -plate.	$\frac{1}{4}$ -plate.
Camera and one Slide only	£3 5 0	£4 10 0
T. and I. Blind Shutter...	0 12 9	0 13 0
Folding Tripod	0 11 9	0 11 9
R. R. Lens, Iris diaphragm	1 6 3	1 16 0
EXTRAS		
Double Dark Slides, B.B.	0 12 6	0 18 9
Stiff Waterproof Canvas Case, Lock and Key and Strap, for Camera and three Slides	0 15 0	0 18 0

"The very best that e'er I saw."—*Midsummer Night's Dream.*

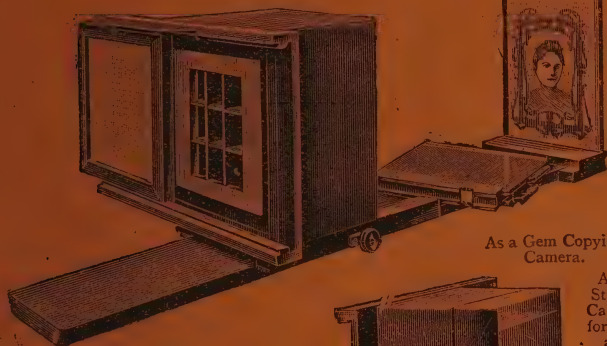
YOUR DEALER WILL SUPPLY YOU.

SHARP & HITCHMOUCH, LIVERPOOL.

**TO SAVE LABOUR AND EXPENSE
THE "APTUS" COMBINED**

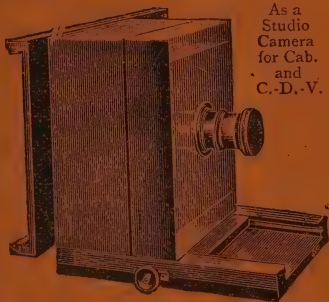
**GEM
VICTORIA
STUDIO
COPYING**

**CAMERA
IN ONE.**



As a Gem Copying
Camera.

As a
Studio
Camera
for Cab.
and
C.-D.-V.



Unlike other Cameras of its
kind.

Repeating for different positions.

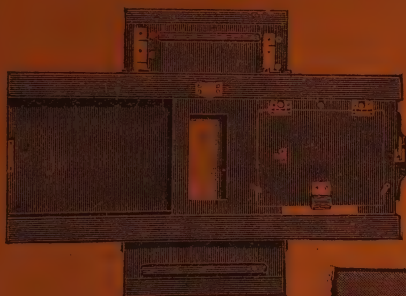
Interchangeable Lenses.

Each Negative has a recorded
exposure.

Sole Makers :

**Sharp & Hitchmough,
LIVERPOOL.**

THE "APTUS REPEATER."



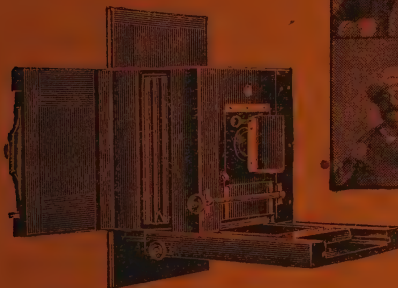
SHOWING REPEATING BACK TWO
WAYS.

The very latest
design and up-to-
date pattern for
1903, and now in
great demand for
seaside and town
work.

**FOR GEM STAMP,
VICTORIA MIDGETS,
and ORDINARY
STUDIO WORK.**



CLASS OF WORK DONE.



FRONT VIEW OF CAMERA AND SHUTTER.

Specimen of work on application to the Sole Makers—

SHARP & HITCHMOUGH, Liverpool.

Don't delay! Write at once!! There is money
in this business, taken at the flood!!!

Particulars and Prices of the "APTUS REPEATER" CAMERA.

SHARP & HITCHMOUGH make this Camera to take 4, 6, 9, or 12 Photos on a half-plate, each picture being of a different person, or as many positions of the same person as desired. The pictures may be taken vertical or horizontal at will, simply by reversing the repeating back. The Camera is arranged for very rapid work and **500 sitters** per day is quite common at popular seaside resorts, and what does this mean? Why, from £25. to £40 per day in takings.

The Camera is beautifully made in mahogany and highly finished, bellows body, rack and pinion focussing adjustment, and also rack and pinion to the rising front. The reversing back repeats both vertically and horizontally. We quote for this Camera to take only one set of photos, *i.e.*, 4, 6, 9, or 12, or other number on a half-plate, but by having extra slides and the necessary attachments, the Camera will do for any or all the combinations, or for Cabinet and C.-D.-V. work. If you want a Camera in any way different to the one above described let us know your wants. S. & H. are specialists at this class of work.

PRINTING FRAME. For use with this Camera we make a specially constructed Printing Frame, which will produce 4, 6, 9, or 12 dozen prints on each piece of paper. We may mention that **one gross** of prints can be made in twelve to fifteen minutes.

PRICE OF "APTUS REPEATER" CAMERA.

For 4, 6, 9, or 12 Photos on Half-plate £7 10 0

LENSES SUITABLE FOR THIS CAMERA.

TT

Aptus Achromatic Meniscus Lens with 1/2 lap Exposing Shutter 0 15 0

Bausch & Lomb R.R. Lens, Iris Diaph., Unicum T. and I. Shutter, Pneumatic Release 2 2 0

Aldis R.R. Lens (English made), working at 6, fitted to B. & L. Unicum Shutter, &c. 4 17 6

Aptus Special Printing Frame for Making 4 or 6 dozen prints 2 0 0

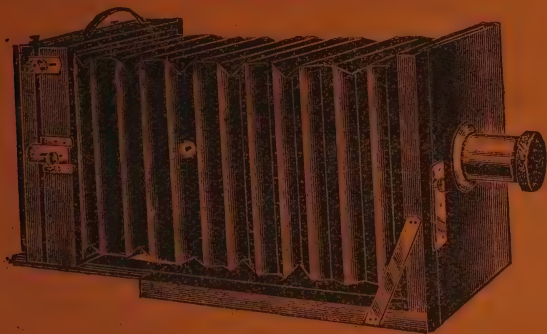
Ditto, for 9 or 12 dozen prints 2 5 0

Write at once to

SHARP & HITCHMOUGH,
Sole Makers, LIVERPOOL.

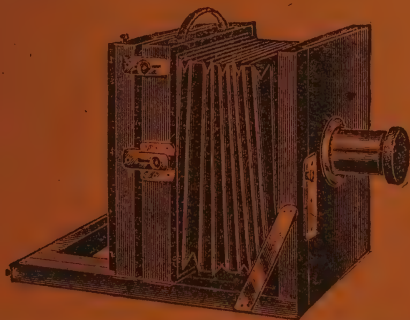
“APTUS” PORTABLE STUDIO AND FIELD CAMERA.

THOROUGHLY well-made and highly-finished French-polished Camera, with rack and pinion or screw adjustment, extra long extension, swing back, reversing back for vertical and horizontal work, rising front, one double dark slide.



PRICES.

						TT
Whole-plate and Dark Slide	...	...	...	...	...	£5 10 0
10 x 8	...	...	...	...	...	6 10 0
Extra Slides, whole-plate	...	...	...	...	...	18/- each.
“ 10 x 8	...	...	...	...	...	25/- each.

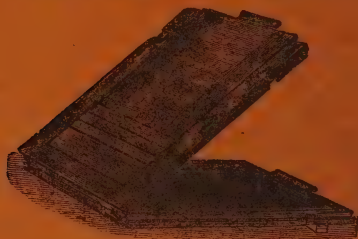


SHARP & HITCHMOUGH

Make a speciality of CAMERAS TO ORDER. Write direct to
101 & 103, DALE STREET, LIVERPOOL.

"Endued with worthy qualities!"—*Two Gentlemen of Verona.*

"APTUS" Mahogany Double DARK SLIDES.



Book Form.

Hinged Shutters.

Spring Snaps.

French Polished.

Special Slides made to order.

Cheap Quality }	$\frac{1}{2}$	5X4	$\frac{1}{2}$	$\frac{1}{4}$	10X8	12X10	15X12	TTT
6 A	5/6	6/6	7/3	13/6	to fit Lancaster Cameras.			
1 A	6/6	7/6	8/2	14/3	21/-	26/-	35/3	
Best	7/3	—	12/3	18/9	27/6	35/6	48/-	
Brass Bound }								
	Postage 3d. each.				Postage 6d. each.			
To fit odd Cameras }	1/-	1/3	1/6	1/9	extra.			

Magazine Automatic Changing Box.

Improved Construction. **Easy to Manipulate.**
Economy in Size and Weight. **Fitted with Sheaths for Plates or Cut Films.**
Less Expensive than Slides.

THE advantages claimed for this Box are Simplicity, Durability, Cheapness, and absolute perfection in the changing arrangement. There are no Mechanical Appliances or Springs to go wrong, the whole working being so simple as to preclude the possibility of a Plate sticking when the Box is in use, the Plate being held in perfect register during exposure. The $\frac{1}{2}$ -plate sizes carry Eight Plates in Metal Sheaths, with an Indicator for showing the number of Plates exposed.



The Box occupies only half the space of four ordinary double Dark Slides, carries the same number of Plates, and is half the weight; while doing all the work of four Slides, it is only one-fourth the cost. Actual outside size of $\frac{1}{2}$ -plate Box, 8x6in.

PRICE COMPLETE, WITH SHEATHS FOR PLATES: TTT
 $\frac{1}{2}$ -plate, 25/-; to carry 8 Plates. 5X4-plate, 22/6; $\frac{1}{4}$ -plate, 20/-; to carry 12 Plates.
 Stereo, 6 $\frac{1}{2}$ x3 $\frac{1}{2}$, for 12 Plates, 7 $\frac{1}{2}$ x5 $\frac{1}{2}$ outside, 25/-.

Fitting to Customer's own Camera, from 2s. 6d. each. Extra Sheaths can be supplied for carrying Cut-Films. Prices on application.

This is believed to be the most Perfect and Cheapest Changing Box in the Market.

SHARP & HITCHMOUGH LIVERPOOL.

SHAKESPEARE says :—

"This deserved the praise of the World."—*Cymbeline*, Act V., Scene 4.



ONE POINT we wish to impress you with is that the

"APTUS"

MAGAZINE HAND CAMERA

is of **British Manufacture**, and it is only by a system of "**Pin Pricks**" that the makers and merchants can impress upon the inexperienced purchaser the fact that **Great Britain stands** far and away in advance of other nations in the Manufacture of Photographic Cameras. She was the Pioneer of Photography, and the first to produce an Instrument known as the **HAND CAMERA**, and up to the present moment, **England stands pre-eminently in the front rank** for ingenuity, quality, and general excellence.

SHARP & HITCHMOUGH, of Liverpool,

the makers of the "**Aptus**" Magazine Hand Camera, were among the **very first** to make Hand Cameras, and of thorough reliable quality, at a price to come within the reach of all. Notwithstanding the fact that at the present time numerous imitations of the world-famed "**Aptus**" Hand Camera are put before the public, some by home makers and some by foreigners, still the fittest survive, in proof of which we would point out that, out of the **many thousands** of "**Aptus**" 30/- Magazine Hand Cameras in use to-day, you rarely, if ever, see one to be disposed of second hand through the sale columns of the Press. The makers of the "**Aptus**" 30/- Magazine Camera do not spend thousands of pounds in publicly advertising their speciality, but trust entirely to "**value received**" for recommendation, as the following extracts from eminent amateur and professional photographers' letters will testify.

"How easy dost thou take all England up."—*King John*, Act I., Scene 3.

Every Camera guaranteed to be capable of turning out work equal to Specimens we publish.

SHARP & HITCHMOUGH, LIVERPOOL.

The "BULLER" Camera.

VERY CHEAP AT PRESENT, BUT OF STERLING VALUE.

Will do First-rate Work if Given a Fair Chance.



Carries Six Quarter-plates in Metal Sheaths, released after each exposure by the "Aptus" system. Is fitted with Achromatic Landscape Lens and shutter for time and instantaneous photographs. Two finders, for horizontal and vertical pictures. This is a very reliable Camera, and is not a toy.

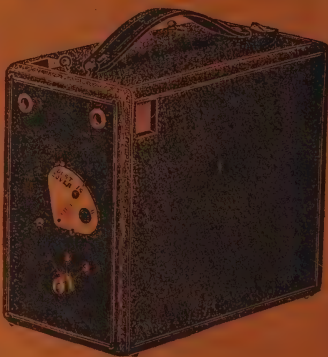
TTF

Price **10/6.** Postage **6d.**

The "KIMBERLEY" Camera.

OF SUPERIOR MAKE.

Carries Twelve Quarter-plates ($4\frac{1}{4} \times 3\frac{1}{4}$) in Metal Sheaths, released after each exposure by the "Aptus" System. Full instructions with each Camera. Case covered in good style. Stitched Leather Handle. Achromatic Lens working at a very large aperture. Time and Instantaneous Shutter with speed adjustment so as to give medium or very rapid exposures. Two Finders, for vertical and horizontal pictures.



This Camera is Capable of Doing First-class Work.

Price **15/-.** Postage **6d.**

TTF

All "APTUS" Cameras are guaranteed to take pictures equal to specimens shown. Do not be persuaded to buy foreign-made goods when British Makers can supply you. **SUPPORT YOURSELF AND COUNTRY!**

MADE BY

SHARP & HITCHMOUGH, LIVERPOOL.

"Know you the quality?"—*Timon of Athens*, Act 3, Scene 6.

SPECIFICATION OF THE

"APTUS GUINEA" MAGAZINE CAMERA.



In Two Patterns,
precisely similar in construction, but varying in shape as figs. 1 and 2.

Automatic Magazine for 12 Plates or 24 Films in Sheaths. When a plate is released after exposure, a figure appears indicating the number of plates used. Fitted with **Achromatic**

Lens working at large aperture. Iris or Rotating Diaphragms, Magnifier or Iso Screen, Bush for Tripod Screw, Case handsomely covered, Stitched Handle, two Finders for vertical and horizontal Pictures, 12 Sheaths for $\frac{1}{4}$ -Plates or Films, with each Camera. Time and Instantaneous Shutter, with speed adjustment from 1-30 to 1-60 sec.

This Camera is the same as the 30/- Magazine, but **not so highly finished**. It will nevertheless do first-class work. Every Camera is properly examined before being offered for sale. Size $8 \times 6\frac{3}{4} \times 4$. Weight 2 lb, 2 oz.

Ask your Dealer to show you one, with specimen of work.

The Price complete is only **21/-** Postage 6d. TTF

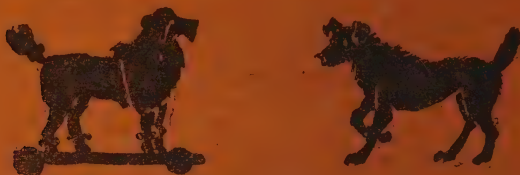
Instructions for working with each Camera. Waterproof Canvas Case for above, with strap, 5/-. Extra Magnifiers, 1/- each.

"Add more from thine invention."—*Antony and Cleopatra*, Act 3, Scene 12.

SHARP & HITCHMOUGH (Sole Makers), **LIVERPOOL**,

TEN YEARS' SUCCESS.

"And not without desert so well reputed."—*Two Gentlemen of Verona.*



Imitation is a sincere form of flattery; but if you decide upon an "APTUS" be assured that you get one, for there are several that resemble it in form only, not in sterling value.

"Deserved high commendation."—*As you like it, Act 1, Scene 2.*

From Mr. PAUL LANGE, the possessor of over 50 Prize Medals for pictures taken by an "APTUS" Camera, the first Folding Hand and Stand Camera made. All Mr. Lange's world-famed Lantern Pictures of Norway and Iceland were made by an "APTUS." The following letters refer to the **30/- Magazine Camera**:—

"3, Tithebarn Street, Liverpool,
October, 1898.

"The other day I sent you some prints that were taken during my holiday, at Beaumaris, and you would be glad to see results obtained with your 'APTUS' 30/- Camera.

"The prints will speak for themselves, and at the same time I am glad to add that the simplicity of the Camera proved admirable, and think that at 30/- for the complete apparatus it cannot be beaten. One of my daughters, knowing nothing of photography, took several scenes, thus showing what can be done.

"Yours truly, "PAUL LANGE."

"39, Parsonage Crescent, Walkley, Sheffield,
October, 1902.

"While writing to you I really ought to compliment you on the surprisingly excellent results obtained by myself and seven or eight more friends, all of whom have 'Aptus' Hand Cameras. I and the other 'Aptus' users consider it without the shadow of a doubt the best and most scientifically made Camera on the market for the money.

"In a competition for the best street scene print the 'Aptus' won 'hands down' against cameras costing four times as much.

"Faithfully yours, "A. E. LONGLEY."

A GOOD
IMPRESSION IS



THE SECRET OF
SUCCESS.

"Excellent device, was there ever heard a better."—*Two Gentlemen of Verona.*

"Science excels in this."—*Measure for Measure.*

THE 'APTUS' MAGAZINE HAND CAMERA

PATENT.

Improved and thoroughly up-to-date. We cannot afford to be behind the times.

So Simple and yet so Peerless.

MARVELLOUS VALUE, BEST WORKMANSHIP,
FINISHED APPEARANCE.

MAGAZINE for 12 PLATES or 24 FILMS in SHEATHS



Jena Glass Achromatic Lens.
Working at Very Large Aperture.

**TWO MAGNIFIERS and
ISO. SCREEN.**

Improved Iris Diaphragms.

Case Handsomely Covered.

Very Durable and Waterproof.
Stitched Handle.

Automatic Counting Indicator.

Two Lustre Finders for Vertical and
Horizontal Pictures.

12 Quarter Sheets for Films or Plates
with each Camera.

Time and Instantaneous Shutter,
with Speed Adjustment. TTF

Sheaths.

Weight, $2\frac{1}{4}$ lbs.

Two Bushes for Tripod Screw.

Size only $8 \times 5\frac{1}{4} \times 5$ inches.

Price only **30s.** complete. The above for 5×4 Plates or Films, **40s.**
Postage 6d.

For INDIA and HOT and DAMP CLIMATES.

The same Camera as above, but made in well-seasoned walnut, dovetailed, clamped doors, brass bound (16 corners), and french polished. Made to stand rough usage. Price **£3 3 0.**

If you have not yet been successful with a Hand Camera, try the "APTUS" MAGAZINE. Acknowledged by all to be the cheapest and best Camera ever produced for the money.

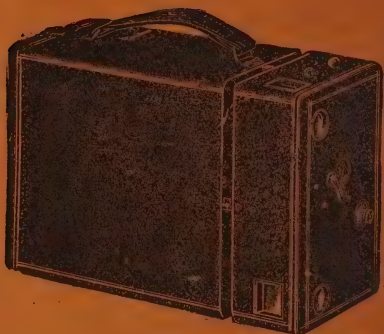
To be obtained from any Dealer at Home or Abroad, or from the Sole Makers—

SHARP & HITCHMOUGH, LIVERPOOL:

THE APTUS "B.P.V."

BEST POSSIBLE VALUE.

The Camera for 1903.



Magazine for 12 quarter plates or 24 films in sheaths, with Automatic Counting Indicator registering the number of exposures.

High - class Achromatic Lens, giving fine definition, with open aperture and rapid exposures. Superior Iris Diaphragms, two Lustre Finders for vertical and

horizontal work. Excellent time and instantaneous shutter with adjustable speeds.

Focussing extension for portraits and near objects accurately scaled in yards. 12 sheaths for plates or films with each Camera. Case very handsomely finished in seal or morocco grain, stitched handle with D pieces for shoulder strap. SIZE $9\frac{1}{4} \times 6\frac{1}{2} \times 4$, WEIGHT $2\frac{1}{2}$ lbs.

PRICE - - 35 - Postage 6d.

OF BRITISH MAKE AND GUARANTEED. TTF

Continental Sizes Made to Order.

Can be obtained in India, Japan, N.Z., Australia, South Africa, &c.

WHOLESALE FROM THE MAKERS—

SHARP & HITCHMOUGH, LIVERPOOL.



"To show merit."—*All's Well*, Act 1, Scene 1.

Backed up by the following,

You should be convinced.

The Testimony of some who are using the

"APTUS" HAND CAMERAS.

"LONGMOOR LANE, LIVERPOOL.

"I have done what I consider some wonderfully good work with such a low-priced instrument. The figure subject shows what the magnifying lens does. I am perfectly satisfied with the working of this camera. I shall be glad to speak personally on its merits to any amateur interested in stereo work.

"Yours, &c., HY. NICHOLLS."

"NEWCASTLE, JAMAICA.

"I have received the 'Aptus' 3os. Camera, &c. I have turned out some excellent snapshots—in fact so good are they that a number of my friends on hearing the price of your camera, and seeing the excellent results I have obtained in so short a time, are determined to become owners of an 'Aptus.'

"Yours, &c., G. BRAVIN."

"HALIFAX.

"P.S.—Although after much rough usage my 'Aptus' is looking a little worse for wear, I have not yet seen the hand camera for which I would exchange.

"J. A. WADE."

"BROMLEY, KENT.

"I am very pleased with the camera, and am surprised how you can sell such an excellent article for so low a price.

"Yours, W. H. HAINES."

All original letters kept for inspection.

SHARP & HITCHMOUGH

Have received many hundreds of letters giving the highest praise to the

APTUS CAMERAS.

Postage abroad on any of these Cameras:—Australia, British East Africa, Cape Colony, Italy, China, and Egypt, 3s.; Japan, 4s.; Canada, Ceylon, Portugal, 2s. 3d.; Constantinople and Malta, 2s. 6d.; U. K., 6d.

"Lead like a fire-brand."—*Tempest*, Act 3, Scene 2.

"More device than pen can give expression to!"—*Troilus and Cressida*.

THE "APTUS" MAGAZINE HAND CAMERA.



The "R.R." Pattern, $\frac{1}{2}$ -plate, fitted with Rapid Rectilinear Lens, Iris Diaphragms, two Lustre Finders, Focussing Mount to Lens Correctly Scaled for various distances, Thornton-Pickard Time and Instantaneous Blind Shutter, with Speed Indicator, Pneumatic Release, and Self-capping Blind. Two Bushes and Screw for Tripod. Very handsomely got up. TTF

Price £4 10 0.

If fitted with "Cooke" Lens in Focussing Mount, in place of the ordinary R.R.,

Price £7 2 0.

Or, fitted with 6-in. focus "Cooke" Lens in Rigid Mount, in place of ordinary R.R.,

Price £6 14 0.

THE "APTUS" NEW-CENTURY CAMERA.

Fitted with Bausch & Lomb "R.R." Lens and Unionum Shutter, Iris Diaphragms, two Lustre Finders, two Bushes and Screw for Tripod. Very handsomely finished.

Price £4 4 0.

Fitted with Aldis Lens and Shutter, £6 17 6.

All "Aptus" Magazine Cameras work on the same correct principle as the celebrated 30s. pattern.



STEREOSCOPIC MAGAZINE CAMERA.

TTF

For Films or Plates, Price

60/=

Size, $8\frac{1}{2} \times 7\frac{1}{2} \times 6$. Weight, 3 lbs. 10 oz.

On the same Correct Principle as OUR CELEBRATED 30s. CAMERA.

THE "APTUS" 30/- PANORAMIC MAGAZINE HAND CAMERA.

MADE on the same correct principle as our celebrated "Aptus" 30/- Camera, and having Automatic Magazine for 12 Plates, $6\frac{1}{2} \times 2\frac{3}{4}$ ins., or 24 Films in Sheaths. After each exposure, and when the Plate is released, a fresh number appears on the Indicator.

Fitted with **Achromatic Lens** working at large aperture, and giving **fine definition**. **Rotating Diaphragms**. Bush for tripod. Spirit level. Case handsomely covered in morocco grain. **Two Lustre Finders**. Twelve Sheaths for Films or Plates. Time and Instantaneous Shutter, with Speed Indicator from $\frac{1}{250}$ to $\frac{1}{20}$ second.



Size of Camera	...	...	...	...	10 x 9 x 3 ins.
Weight	...	...	...	...	2 lbs. 8 ozs.

This Camera will NOT give distorted pictures.

We have in stock a limited number at

PRICE **21/-** = With One Finder.

IMPERIAL PLATES, $\frac{1}{3}$ per doz.

PRINTING FRAMES, $\frac{1}{6}$ each.

SPECIMEN OF WORK FROM

SHARP & HITCHMOUGH, LIVERPOOL.

When ordering through Merchants please state that
"Aptus" goods are required.

"Unrivalled Merit!"—*Two Gentlemen of Verona*. Act V., Scene 4.

"Aptus" Magazine Hand Camera.

INSTRUCTIONS.

The Lens has a fixed focus for objects at a distance of from 6 yards to 12 yards.

The Aperture of largest stop is $f\ 11$.

The Speed of Shutter is estimated as $\frac{1}{100}$ th second normal.

Increase Speed by turning knob near lens; No. 2 equals $\frac{1}{40}$ th second; No. 3 equals $\frac{1}{60}$ th second.

1.—**To Set the Shutter**.—Pull out the cord with the ring attached to the full extent, but without forcing, and let go the cord. **The Shutter** is now set for instantaneous.

2.—**To Release the Shutter**.—Pull the knob gently, at the same time holding the Camera firmly, so that it will not move during exposure. **Please take note of this.**

3.—**For Time Exposure**.—Pull out the cord as above, but only half way, and let go; this will allow the Shutter to remain open as long as required. During a time exposure it is necessary that the Camera should be secured to a tripod, or otherwise kept perfectly rigid. The Shutter is closed as described in No. 2.

Two Focussing Magnifiers and Isochromatic Screen are supplied with 30/- Camera. Every Camera has been examined and found to be in thorough working order before being offered for sale.

"The very Best that e'er I saw!"—*Midsummer Night's Dream*. Act V., Scene 1.

4.—**Sheaths**.—The Sheaths should be arranged with the notches in alternate positions, so—



before entering the dark room, and then the plate inserted in the grooves, with the film side of the plate to face the lens when inserted in the Camera.

See that the plate is pushed well down in the grooves, so that the notches are clear.

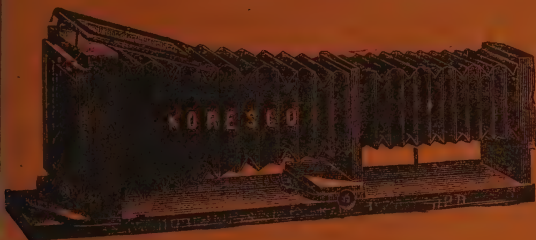
5.—**Films** are inserted in the same way as plates, but the Sheaths being thin the Camera will contain 24 instead of 12.

6.—**To release the plate** it is only necessary to push the small projection on the top of the Camera, **one way only**, as far as it will go, when a fresh number will appear, indicating that a plate or film has dropped. To release the next plate push the projection back again as far as it will go.

"KORESCO"

Enlarging Camera.

15 × 12



PRICE

72/-

PACKING 2/-
EXTRA.

Have you a $\frac{1}{4}$ -plate APTUS Hand Camera, TF
Kodak, Frena, or any other?
Do you wish to make Enlargements?

PRICES.

15 × 12 KORESCO includes Camera. Rack Focus arrangement (one $3\frac{1}{4}$ and one $8\frac{1}{2}$), Achromatic Lenses. 16 × 13 single Slide. 15 × 12, 12 × 10, 10 × 8, and $\frac{1}{4}$ -plate Carriers. Board to carry 16 × 13 or smaller sizes of Bromide Paper. Price complete, for enlarging only, 72/-

$\frac{1}{2}$ -plate single Slide with $\frac{1}{4}$ -plate and Lantern Slide Carriers, for reducing to $3\frac{1}{4}$ × $3\frac{1}{4}$, $\frac{1}{4}$ -plate, or $\frac{1}{2}$ -plate, 8/- extra.

$\frac{1}{4}$ -plate KORESCO includes Camera. Rack Focus arrangement ($3\frac{1}{4}$ focus), Achromatic Lens. $\frac{1}{4}$ -plate single Slide. One $\frac{1}{4}$ -plate Carrier. Board to carry $\frac{1}{4}$ -plate or smaller sizes of Bromide Paper. Price complete, for Enlarging only, 30/-

$\frac{1}{4}$ -plate Slide with Carrier for making Lantern Slides, 5/- extra.

Cheap Copying and Reducing Cameras.

For making Lantern Slides and Window Transparencies.

Fixed Focus. Including Achromatic Lens.

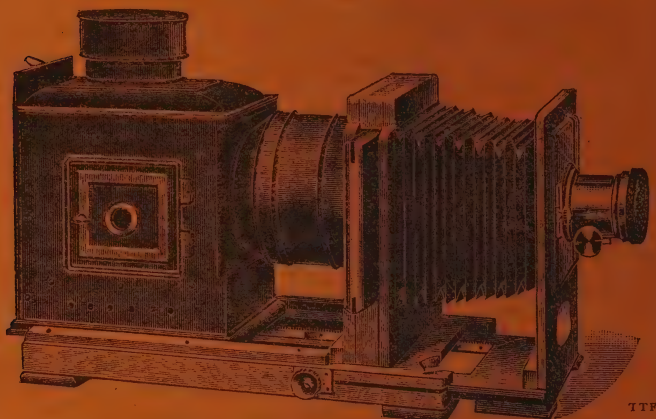
TTF

For $\frac{1}{4}$ -plate negatives, 10/6. 5 × 4 negatives, 12/6. $\frac{1}{2}$ -plate negatives, 15/-

All Prices in this List are subject to Alteration without notice.

THE "APTUS" ENLARGER

HAS STOOD THE TEST OF EIGHT SEASONS.



A PRACTICAL ENLARGING LANTERN with Cloth Bellows and extending Front with Clamping Screw. Rising Front for adjustment of Lens. Perfectly light-tight Russian Iron Body and Carrier to take negatives vertical or horizontal.

The great advantage of this form body is that either Incandescent Gas, Oil Lamp, Acetylene, Limelight, or any other illuminant can be used without constructional alterations, besides remaining much cooler in use than the old form of small oil bodies.

The $5\frac{1}{2}$ ins. is fitted with Blocks so as to take an ordinary Carrier for **PROJECTING LANTERN SLIDES**.

It is particularly noted the **CONDENSERS ARE OF BEST MANUFACTURE**, the optical qualities of each being carefully tested in a laboratory fully equipped with special apparatus for this purpose, and only faultless ones are fitted.

$5\frac{1}{2}$, $6\frac{1}{2}$, and $8\frac{1}{2}$ Condensers are the smallest sizes that will cover $\frac{1}{4}$, 5×4 , and $\frac{1}{2}$ -plate respectively.

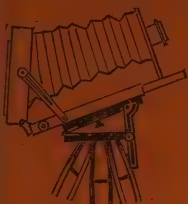
	DIAMETER OF CONDENSER.		
	$5\frac{1}{2}$ in.	$6\frac{1}{2}$ in.	$8\frac{1}{2}$ in.
	13.9 cms.	17.7 cms.	20.9 cms.
Plain Walnut, with Sliding Base, Condenser, Carrier, Tray, and Cowl	£ s. d.	£ s. d.	£ s. d.
Ditto, with Incandescent outfit	3 7 6	4 16 6	6 15 0
Ditto, Ditto, with Portrait Lens or R.R. Lens, with Yellow Glass Cap for focussing	4 0 0	5 10 0	7 7 6
	4 18 6	6 16 0	9 0 0

FIRST QUALITY, EXCELLENT FINISH—

Polished Mahogany, Rack and Pinion Adjustment, Leather Bellows, Condenser, Carrier, and Tray	4 8 0	6 8 0	8 8 0
Ditto, fitted Incandescent.	5 10 6	7 5 0	9 0 0
Ditto, with Portrait Lens or R.R. Lens, with Yellow Glass Cap for focussing	6 9 0	8 7 6	10 12 6

Condenser, with Special Adapter for **Projecting Lantern Slides**, extra 10s. 6d.

Specially constructed, first quality, 4-wick Oil Lamp, suitable for Enlarging or Projecting, extra 15s.



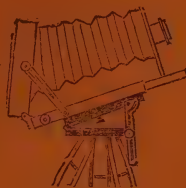
CAMERA TILTING & RIGHT ANGLE BOARDS.

For Photographing Objects on the
Floor or on the Ceiling. TTF

Suitable for $\frac{1}{4}$ or $\frac{1}{2}$ -plate Cameras ... 10/6

" " $\frac{2}{3}$ " $\frac{1}{2}$ " " ... 15/-

LARGER SIZES MADE SPECIALLY.



THE VERY LATEST IN SHUTTERS.

THE SMALLEST AND MOST COMPACT SHUTTER MADE.

"APTUS" Speciality Shutter.

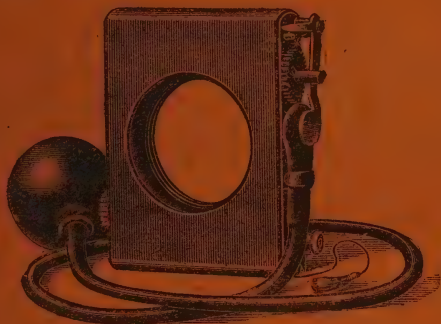
Time and Instantaneous
Speed Indicator,

Ball and Tube Release.

$1\frac{1}{2}$ in. diameter, 11 9.

2 " " 17/-

Postage, 3d. TTF



The "APTUS" Hand-Camera Shutter.



Time and Instantaneous.

Mounted on piece of wood
ready for fitting.

Price 2/6,

Postage, 2d. TTF

SHARP & HITCHMOUGH,
Manufacturers of Photographic Brasswork, Woodwork, &c.,
LIVERPOOL.

'APTUS' PAINTED BACKGROUNDS.

IF PAINTED IN OIL 6s. EACH EXTRA.

No. 1.



No. 2.



Painted on 'Aptus' Washable Cloth. From all Dealers. We are the Makers.

No. 9.



No. 13.



8 x 6 feet, 15s. each. 8 x 7 feet, 20s. each. 8 x 8 feet, 25s. each.

SOLE MAKERS: **SHARP AND HITCHMOUGH, LIVERPOOL.**

'APTUS' PAINTED BACKGROUNDS.

Mounted on Rollers; Top and Bottom. Any Design Painted to Order.

No. 19.

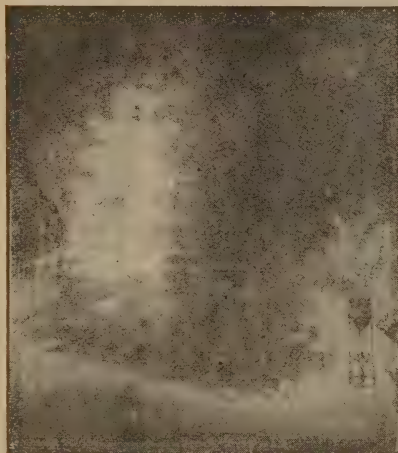
No. 20.



8 x 6 feet, 15s. each.
No. 23.

8 x 7 feet, 20s. each.

8 x 8 feet, 25s. each.
No. 24.



8 x 6 feet, 15s. each.

8 x 7 feet, 20s. each.

8 x 8 feet, 25s. each.

Price List of Graduated Grounds, page 1387.

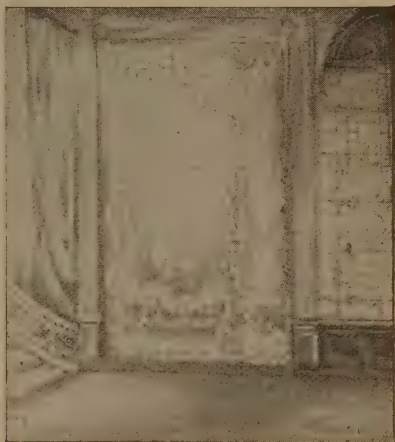
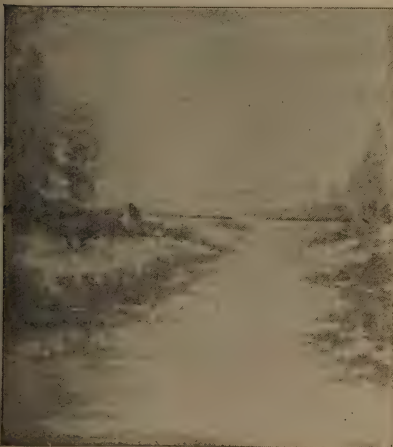
'APTUS' PAINTED BACKGROUNDS.**IF PAINTED IN OIL 6s. EACH EXTRA.**

No. 25.

No. 26

8 x 6 feet, 15s. each.
27.

8 x 7 feet, 20s. each.

8 x 8 feet, 25s. each.
No. 28.

8 x 6 feet, 15s. each. 8 x 7 feet, 20s. each. 8 x 8 feet, 25s. each.

SOLE MAKERS: SHARP AND HITCHMOUGH, LIVERPOOL.

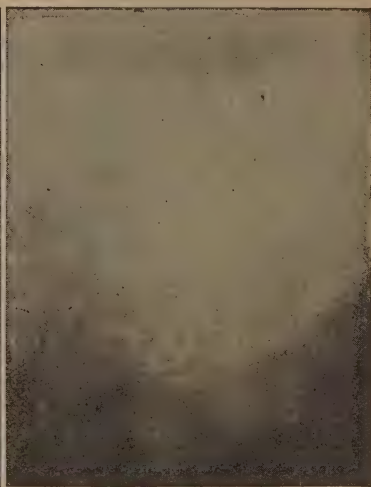
No. 6A.

GRADUATED.

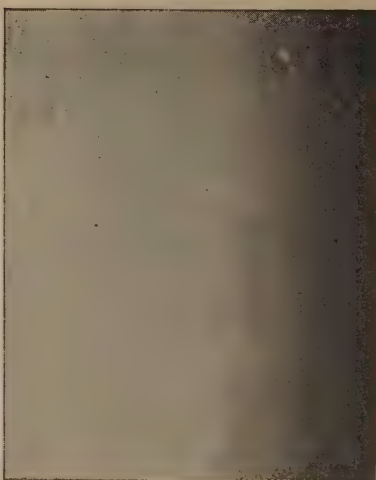
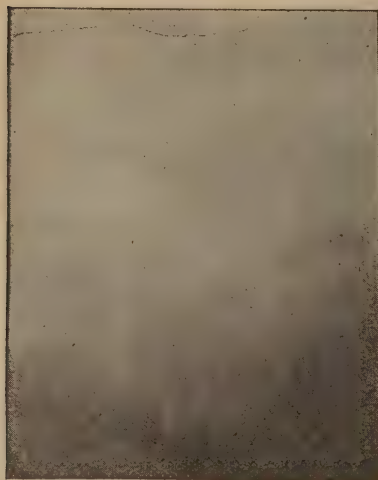
No. 5A.



No. 7A.



No. 8A.



Prices for Graduated Grounds, page 1387.

Unlike other backgrounds of this class 'Aptus' Backgrounds answer a double purpose, as they may be had plain or graduated on the reverse side.

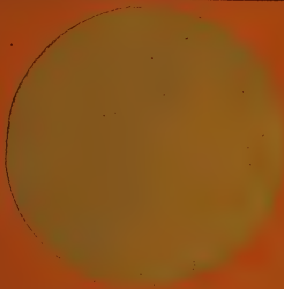
PHOTOS SENT ON APPROVAL.

Studio Grass Mats 5d. per square foot.

"APTUS" WASHABLE CLOTH BACKGROUNDS

To be obtained through all Wholesale Houses and Dealers in
Europe, Asia, Africa, & America, or from

SHARP & HITCHMOUGH, LIVERPOOL.



DIFFERENT COLOUR EACH SIDE.

Slate and
Cream.

Slate and
Blue.

Slate and
Stone.

"Aptus" Portable Elevator

TTF

FOR BACKGROUNDS.

6 feet ... 7/5 each. 8 feet ... 8/6

The top Roller of Background forms the top rail of Elevator.

IN FLATTED OIL, PLAIN AND GRADUATED.

Always clean, flat, and free from creases.

Mounted on Rollers top and bottom. Samples on application.

Sizes.	Different colour each side. Plain.	Special colours or one side graduated in distemper.	Special colours or one side graduated in oil.	Sizes.	Different colour each side. Plain.	Special colours or one side graduated in distemper.	Special colours or one side graduated in oil.
60x40	2/-	5/-	5/9	72x72	6/3	13/-	13/9
60x40	2/5	6/2	7/-	90x72	7/8	16/-	16/8
70x40	2/9	7/3	8/-	96x96	13/6	24/-	24/9
70x60	5/-	10/3	11/-	108x72	9/-	19/6	20/3

TTF

TTF

TTF

TTF

40 in. wide, per yard 1/1 1/2 } 72 in. wide, per yard 2/9 } in Cream and Slate, Slate and
60 " " 2/1 1/2 } 96 " " 4/9 } Blue, Slate and Stone.

The graduated series are plain on one side.

Will Dealers and Shippers please write for wholesale terms?

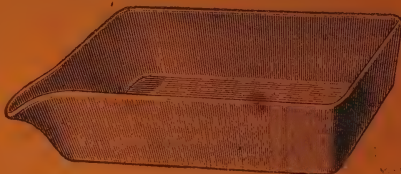
SHARP & HITCHMOUGH, LIVERPOOL.

GRANITINE DISHES ^{TT}

(ENGLISH MAKE).

SHALLOW.

$\frac{1}{2}$	...	7/7
5×4	...	8/8
$\frac{1}{2}$	...	10/10
$\frac{1}{2}$	...	1/2
10×8	...	1/6
12×10	...	2/2



DEEP.

$\frac{1}{2}$	...	8/8
5×4	...	9/9
$\frac{1}{2}$	...	1/-
$\frac{1}{2}$	...	1/6
10×8	...	1/8
12×10	...	2/9
15×12	...	7/3
16×14	...	9/10

Deep, 18×14, 11/8 20×16, 18/-

THE "LIVER SEMI-PORCELAIN."

(ENGLISH MAKE.)

TTF

$\frac{1}{2}$ -Plate	...	6/6 per doz.	...	7d. each	|	9×7	...	12/6 per doz.	...	1/1 each
5×4	...	7/6	"	8d.	"	10×8	...	15/-	"	1 4 "
7×5	...	9/-	"	10d.	"	12×10	...	24/6	"	2/2 "
				15×12	...	...	...	5/- each.		
				15×14	...	...	...	8/-	"	
				19×15	...	...	...	11/-	"	
				20×16	...	...	...	15/6	"	
				24×19	...	...	...	24/-	"	

CELLULOID TRAYS (Unbreakable).

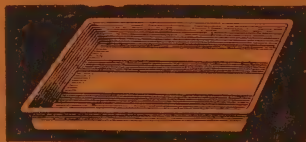
VARIOUS COLOURS.

Size.	Ordinary.	Transparent.	With Patent Lifters.
$\frac{1}{2}$ -Plate
5×4
Stereo
$\frac{1}{2}$ -Plate
7 $\frac{1}{2}$ ×5
Whole-plate
10×8
12×10
15×12

TTF

TT

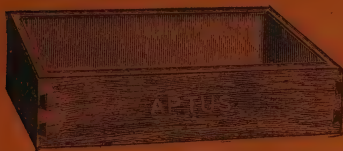
TTF



SHARP & HITCHMOUGH, LIVERPOOL.
Manufacturers of Photographic Specialities.

LEAD-LINED WOODEN SINKS.

TT



20 × 15 × 3½	...	...	...	11/6
24 × 17 × 3½	...	...	...	15/6
30 × 19 × 4	...	...	...	18/6
36 × 25 × 5	...	...	...	25/-

Larger sizes made to order.

WOODEN TRAYS, with Class Bottoms, for Bromide Work.

13 × 11	...	5/6	16 × 13	...	6/6	18½ × 15½	...	9/-	24½ × 18½	...	12/-
TTF			27 × 23	...	15/6	31 × 23	...	18/-	33 × 28	...	22/6

**"Granitine" Plate Washer**

Fitted with Syphon & Conduit.

TT	Each
For 9 ½-plates	4/6
" "	5/6
" Whole-plates	7/6

"Granitine" Fixing Bath.

The "LIVER" Fixing Bath.

Without Syphon or Conduit.

TT	Each	Each TTF
For 9 ½-plates	3/6	2/6
" "	4/6	3/6
" Whole-plates	5/6	4/6

"Granitine" Developing Trough.

To hold 9 Plates in Grooves.

Price, ½-plate, 5/- each; ¾-plate, 6/- each. TT

The "Liver" Trough.

½-plate, 3/- each; ¾-plate, 4/- each.

"Granitine" Draining Racks.No. 1 Size, for ½-plate to ¾-plate—
1/- each. TTNo. 2 Size, for Whole-plates—
1/3 each.**The "Liver" Draining Racks,**
8d. and 9d. each.

Dealers will find it to their advantage to obtain Terms from
SHARP & HITCHMOUGH, LIVERPOOL.

MADE IN ENGLAND.

The "Mersey" Washer.

	Each.	Doz.
$\frac{1}{2}$ and 5×4 ...	5/6	63/-
$\frac{1}{2}$ -plate ...	7/6	81/-
$\frac{1}{2}$ " ...	10/6	105/-

Packing extra. TTF



Celluloid Plate-Lifters.

$\frac{1}{2}$, 5×4 , and $\frac{1}{2}$ -plate ... 5d. each; 4s. 8d. doz.
Whole-plate ... 7d. ... 6s. 8d. ...

TTF

Deal Plate Boxes for Negatives.

BEST QUALITY ONLY.

Each Groove Numbered.

TTF

Size.	For 12		For 24		For 50	
	per doz.	each.	per doz.	each.	per doz.	each.
$4\frac{1}{2} \times 3\frac{1}{2}$...	14/-	1/3	16/6	1/6	21/-	1/10
5×4 ...	15/-	1/4	17/6	1/8	24/-	2/1
$5\frac{1}{2} \times 4\frac{1}{2}$...	20/-	1/10	23/-	2/2	30/-	2/7
$8\frac{1}{2} \times 6\frac{1}{2}$...	26/-	2/4	32/-	3/-		
10×8 ...	40/-	3/6				
12×10 ...	54/-	4/9				

WOOD GROOVING FOR PLATE RACKS OR BOXES, 11 inch's wide, 1'-foot.

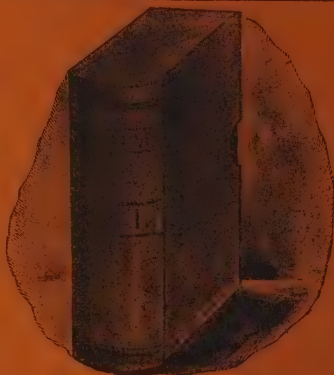
Light-Tight Boxes, for Dry Plates.

For the Systematic Storage of
Negatives.FITTED WITH PAPER-COVERED METALLIC
GROOVING, occupying smallest possible
space.The Plates can be stored close together,
and yet sufficient space to avoid contact.

PRICES. TTF

6 grooves, for 12 plates. $2\frac{1}{2}$ inside
measure. Cloth covered.

Size.	doz.	each.
$4\frac{1}{2} \times 3\frac{1}{2}$...	8/-	8d.
5×4 ...	9/-	9d.
$6\frac{1}{2} \times 4\frac{1}{2}$...	10/6	11d.



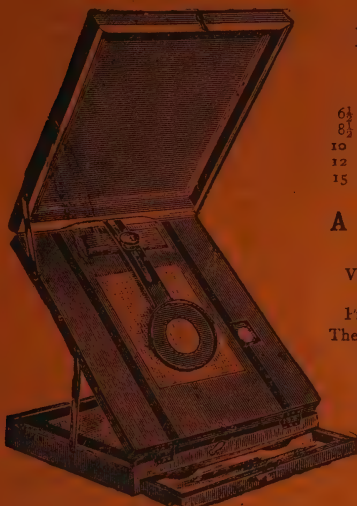


Fig. 1.

"APTUS" RETOUCHING DESKS.

Special Line 4/6 each.

10 X 8 AND ABOVE, WITH DRAWER.

6½ × 4½	...	7/6	Mahogany	TT
8½ × 6½	...	10/6	"	...
10 × 8	...	16/6	"	...
12 × 10	...	20/-	"	...
15 × 12	...	25/-	"	...

A New Retouching Desk.

For the Professional Photographer.

Very handsomely made in Walnut and Mahogany. (As fig. 1.) TT

Prices:—1, 31/6. 10×8, 42/- 12×10, 63/-

The negative is held under the spring di-c in any desired position, and all light being blocked out except that passing through the portion being worked, a tinter is provided to ascertain the colour and density of pigment before applying to negative. It is pronounced the most perfect common-sense Retouching Desk made.



OUR NEW "APTUS"

PRINTING FRAME.

¼-plate 5/-	per doz.	5/-	each	TTF
5 × 4	8/-		8d.	"
¾-plate	9/-		9d.	"
1-plate	18/-		1/6	"
1½ × 8	36/-		3/-	"
1½ × 10	48/-		4/-	"
1½ × 12	72/-		6/-	"

Deep Printing Frames with Plate Glass. TT

12 × 10, 16/-	28 × 20, 45/-
15 × 12, 21/6	32 × 24, 55/-
25 × 17, 30/-	42 × 29, 90/-
54 × 33, 150/- each.	

OUR NEW STEREO PRINTING FRAME

for making Transparencies from Negatives without transposing by cutting,
4/- each, for Negatives 6½ × 3½, 6½ × 4½, and 6½ × 4¾. TT

STEREO MATS, ASSORTED SHAPES ... 1/-

SHARP & HITCHMOUGH, LIVERPOOL.

Manufacturers of Photographic Specialities.

FOCUSSING CLOTHS

Entirely supersedes the Ordinary Focussing Cloth.



It consists of a conical light-tight hood, the large end of which fits on the back of the camera by an elastic band, and the small end is fitted with a leather eye-piece which fastens by elastic loops round the ears of the operator.

Advantages.— Perfect exclusion of light, thereby securing a brilliant image on the screen and greatly facilitating fine focussing. No need to remove the hat. The wind has little or no effect upon it. Both hands are free. Extremely simple and quickly adjusted.

Prices.

In Silcot Lined ... 1-plate size, 2/6; 1-plate, 3/-; 1-plate, 4/-.
In superior Velveteen (fast pile) Lined ... 1-plate size, 4/-; 1-plate, 5/-; 1-plate, 6/6.
Postage 3d.

PLAIN CLOTHS.

Rubber Cloth, 36 × 30, 2/6. Ditto, Velvet Cloth, 36 × 30, 7/6.
Sateen Cloth, 36 × 42, 2/9 each.

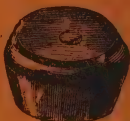
Focussing Cloths & Changing-Bags Combined

1, 7/6 ... 1, 10/- ... 1, 12/6 each.

“APTUS” CAMERA LEVELS.



No. 1.



No. 2.



No. 3.

Nickel and Brass. 1/- each. Flush and Countersunk.

TTT

“APTUS” RUBY AND CANARY FABRIC,

FOR DARK-ROOM WINDOWS, 1/- per yard.

TTT

Per Roll of 38 Yards, 24s.

Masks and Discs, C.D.V. and Cabinet, Assorted in Boxes, 1s.

VERY POPULAR LINE.

TTT



“APTUS” PINS.

For Suspending Enlargements, Prints, and Films while Drying. Twelve in Box, price 6d.

To be obtained from all Dealers, or from
SHARP & HITCHMOUCH, LIVERPOOL.

CAMERA CASES.

LEATHER CASES.

These are made out of the best hide, lined, partitions to carry Camera, Lens, three Slides, &c. Lock and Key, Hand and Shoulder Strap.

In ordering, please give Measurements.

$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	10 x 8
12/6	20/-	27/6	37/6
	12 x 10	45/-	

LEATHER CASE.



WATERPROOF CANVAS CASES

Stiff, as above, $\frac{1}{2}$ 9/- TTF

$\frac{1}{2}$...	10/-	$\frac{1}{2}$...	12/6
10 x 8 ...	15/-	12 x 10 ...	20/-

Lock and Key, 2/6 extra.

Other sizes made to Order.

COLLAPSIBLE CANVAS CASES

(Waterproof).

$\frac{1}{2}$...	3/9	$\frac{1}{2}$...	5/3
		6/9	

To hold Camera, three Slides, Lens, &c.



HAND CAMERA CASES for the

21/- and 30/- "APTUS," TTF

$\frac{1}{2}$ plate, 4/- each. $\frac{1}{2}$ 5 x 4, 5/6 each.

Special sizes made to Order.

SOFT CANVAS CASES SAME PRICE.

Will Dealers please write for terms to
SHARP & HITCHMOUGH, Liverpool.

CARD AND PAPER CUTTERS

Suitable for Professional and Amateur Photographers

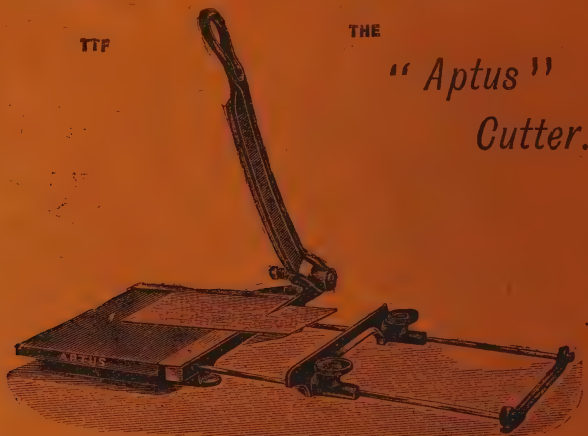
As well as for use in Office and Manufactory.

THESE Cutters are well constructed in every detail. The tables are made of hard wood and fitted with a graduated back gauge. The movable Steel Blades are curved, giving a drawing cut so essential to smooth work.

The efficiency of the Cutters is increased by the combination of the curved movable blade and the peculiar construction of its pivotal spring joint, which allows the blade a slight lateral motion and thus secures perfect contact of the two blades at every point.

This gives smooth edges to the card or paper which is cut. A straight upper blade, as used in some cutters, tends to push or crowd the work out of place.

The superiority of the improvements over the ordinary straight blade with bolt-joint may be readily demonstrated in theory, but a much better and quicker evidence is to test the machines.



TTF

THE

"Aptus"
Cutter.

This is the popular, general, all-round machine, with a 12-inch blade, meeting the requirements of a medium-sized cutter. A distinctive advantage is secured by a peculiar arrangement of the joint, by means of which a sheet of any length may be cut. Particularly adapted to cut a great number of small pieces of uniform size rapidly. The table is 13 x 12 inches, and fitted with sliding gauge.

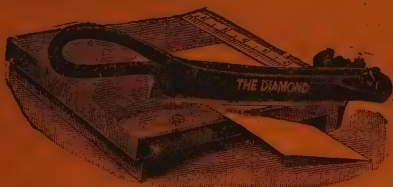
Weight 15 lbs.

Price 31/6.

Trade Terms from

SHARP & HITCHMOUGH,
103, Dale Street, Liverpool.

THE . .
“Diamond”
 Photo
 Trimmer



Is practically a smaller edition of the “Dandy” Trimmer, and is made to meet the demand for a still lower priced cutter. The blade is 6 inches in length, while the table is 6 inches square with graduated back gauge. It should find a place in every Amateur’s vacation trunk.

Weight 2 lbs.—Postage 6d. **Price 7/6 each.**

THE . .
“Dandy”
 Photo
 Trimmer



Has all the advantages of the “Studio” cutter except in size. The blade is 8 inches in length, while the table is 8 inches square with graduated back gauge. It is just the thing for the Amateur Photographer.

TTF

Weight 2½ lbs.—Postage 7d. **Price 10/6 each.**

The “Studio” Cutter The same as above.

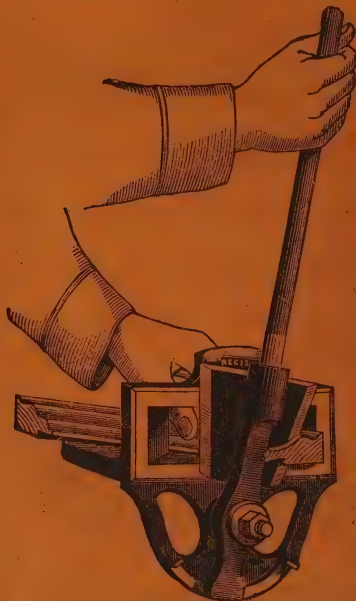
Has a 10 inch blade, and is very suitable for trimming photographic prints or for general use in the office or manufactory. The table is 10 inches square and fitted with graduated back gauge.

Weight 3½ lbs.—Postage 8d. **Price 12/6 each.**

TRADE TERMS FROM

SHARP & HITCHMOUGH, LIVERPOOL.

REGISTERED MITRE-CUTTING MACHINE.



Invaluable to Joiners, Picture-frame Makers, and Amateurs.

No. 1.—TO CUT 2-INCH MOULDINGS.

Mitre-Cutting Machine	15/-	TF
Extra Cutter	4/-	
Spanner	9d.	
Packing Case	6d.	

Weight complete, 18 lbs.

No. 2.—TO CUT 4-INCH MOULDINGS.

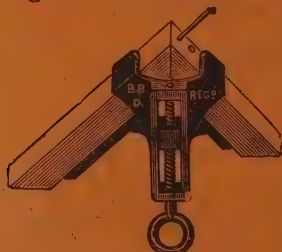
Mitre-Cutting Machine	30/-	
Extra Cutter	7/-	
Spanner	1/-	
Packing Case	9d	

Weight complete, 42 lbs.

This Machine supplies Joiners, Picture-frame Makers, and Amateurs with a tool which, for general utility, handiness, accuracy, and expedition, cannot be excelled. It cuts a clean mitre joint with unfailing accuracy, dispensing with the use of the saw and the plane, and also the usual mitre-cutting and shooting board. It is the only mitre-cutting machine which will cut ordinary gilt mouldings without injury to the gilt surface or composition. No special skill is required to use it; in fact, with this instrument Picture Frames can be easily made and put together without the aid of a skilled mechanic.

TF

Registered CORNER CRAMP.



No. 1. No. 2. No. 3.

Will take 1½ in. to 2 in. to 2½ in. to 4 in. Mouldings.
Price 2/- 3/- 5/- per pair.
Postage 3d. 4d. 9d.

The Registered Corner Cramp is intended for gripping securely two sides of a Picture Frame during the process of nailing together.

TT

OAK MOULDING.

TTT



A	P	T	U	S
1½ inches.	1½ inches.	1 inch.	1½ inches.	1½ inches.
12 feet, 2/3	12 feet, 2/3	12 feet, 1/6	12 feet, 2/-	12 feet, 2/3
100 ,, 15/-	100 ,, 15/-	100 ,, 10/-	100 13/6	100 ,, 15/-

Will Dealers please write for Discount.

SHARP & HITCHMOUGH, MANUFACTURERS, LIVERPOOL.

ORIGINAL 'APTUS' ROLLER SQUEEGEE.

Diameter of Roller.	Length.	Each.
1 inch.	3 inch.	6d.
1 1/2 "	4 "	8d.
TTT 1 3/4 "	5 "	10d.
Very strong twisted Handles.		
1 1/2 inch.	6 inch.	1/6
1 3/4 "	7 "	1/9
1 7/8 "	8 "	2/-
1 3/4 "	9 "	2/3

Polished
Handles,
Nickelled
Ferrules,
best make.

**PRINT TRIMMER.**

Useful for cutting out Patterns in Cloth or Paper, cutting Tobacco Leaves for Cigar Making, &c
Price 1s. 6d.

By far the best made and most perfect wheel trimmer on the market, having the very great advantage over any other wheel knife, that owing to the wheel being hollow, with the cutting edge flat, it can readily be sharpened to a razor-like edge merely by rubbing on an ordinary oilstone.

TRIMMER FOR CUTTING

Circles, Ovals,
Domes,
and Cushions.

With 6 Circular
Metal Shapes for
Cameo Prints.

TTT Price 3s.

Oval and other shapes
made to order specially
from 6d. each.

**TRIMMING KNIVES.**

BEST SHEFFIELD. FOR DEALERS.

One Dozen, on nice Card, 9s.; 9d. each.
A cheaper quality, polished Boxwood handles,
12 on Card, 6s.; 6d. each.

THE 'DIAMOND' GLASS CUTTER. 1/-

A Really Good and Serviceable Tool.
Extra Cutting Wheels may be had.





"APTUS" BY-PASS GAS BURNERS.

This Burner should be used in every dark room. It is attached to any gas bracket the same as an ordinary burner; by shutting the tap the gas is rendered quite invisible but non-extinguished, and can at any moment be relit without the use of matches. This Tap is simply invaluable for the rapid printing processes, lantern-slide making, &c.

Price	...	3/6.
Postage	...	1d.
TTT		
Cheaper quality, 1/6 each	Postage, 1d.	
TTT		

Will Dealers please apply for Wholesale Terms.



FILM CLIPS.

TTT

for suspending films while drying, with hook for hanging on string or wire, or with eye for hanging on nail. **9d.** per dozen in box.

UNTONED PRINT CASES

LINED RUBY FABRIC

for Storing Prints before Toning and Fixing.

$\frac{1}{2}$ -plate, **9d.** each; whole-plate, **1/6** each. **TTT**



"APTUS" MASKS AND DISCS.

In Boxes, assorted Shapes.

TTT

C.D.V. and Quarter ... **6d.**
Cabinet and Half-plate ... **1s.** } per Box.

"APTUS" METAL SHEATHS FOR PLATES.

FOR MAGAZINE HAND CAMERAS.

5T

Quarter-plate, **4/-** per dozen.

5x4, **6/-** per dozen.

"APTUS" METAL-BOUND SHEATHS FOR FILMS.

TTT

Quarter-plate, **4/6** per dozen.

5x4, **6/6** per dozen.

Half-plate, **9/-** per dozen.

Special Terms to Dealers and Wholesale Houses.

ANY KIND OF SHEATH MADE TO ORDER.

FOR SPECIALTIES WRITE TO

SHARP & HITCHMOUGH,
PHOTOGRAPHIC INSTRUMENT MAKERS,
LIVERPOOL.

FOCUSSING GLASS (Finely Ground). TTF

SIZE.	Each.	Per Doz.	Per Gross.
4½ × 3½	1½d.	1/4	11/6
5 × 4	2½d.	2/1	21/-
6½ × 4½	3½d.	3/1	32/-
8½ × 6½	6d.	5/-	57/-
10 × 8	9d.	7/6	83/-
12 × 10	1/6	15/-	150/-

FOCUSSING SCREENS. TTF

Celluloid, Unbreakable, Thick.

	Thick.	Extra thick.
Quarter-plate	4d. each.	—
5 × 4	7d. "	—
Half-plate	9d. "	1/6 each.
7½ × 5	1/2 "	2/3 "
Whole-plate	—	2/8 "

**FOCUSSING MAGNIFIERS**

for viewing the image on ground glass without the aid of cloth.

Screw adjustment 1/6 each. TT

FOTONIC BLOTTING BOOKS.

Fluffless, Chemically Pure Blotting Paper.

No.	Size	each
1	6 × 4½	4d. TTF
2	9½ × 6	7d.
3	9½ × 8	9d.
4	12 × 9½	1/-

**NOVELTY****CELLULOID GRADUATED MEASURES.**Marked in drams and ounces. Very light and unbreakable.
Must not be used for spirit. TTF

	2 OZ.	4 OZ.	6 OZ.	10 OZ.	20 OZ.
Per doz.	9/10	13/4	20/-	23/4	28/-
Each	10d.	1/2	1/9	2/-	2/6

CELLULOID STIRRING RODS.

Spoon Ends.

Per doz. 5/- Each 5d. TTF

SHARP & HITCHMOUGH, LIVERPOOL.

GLASS FUNNELS.

(Ribbed).



2 in.	2½ in.	3 in.	3½ in.	4 in.	4½ in.	5 in.	diameter.
3/8	4/4	5/-	5/8	6/-	8/-	9/-	per dozen.
4d.	5d.	6d.	7d.	8d.	9d.	10d.	each.

Argentometers or Bath Testers and Glass Cell, 2/6. TT

DROPPING BOTTLES, -/3, 1/-, 1/3 each. TT

CELLULOID FUNNELS.

	2 in.	3 in.	4 in.	5 in.
Per doz.	6/8	8/4	11/9	14/8
Each	7d.	9d.	1/-	1/3

TTF

COMPRESSED FIBRE FUNNELS.

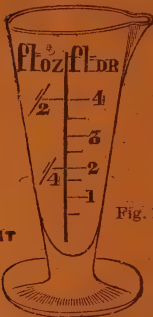
	5 in.	6 in.	7 in.	8 in.
	15/-	17/6	18/9	20/-
	1/4	1/6	1/8	1/9

TTF

FILTERING PAPERS (Circular), in packets of 100.

	6 in.	8 in.	10 in.
8/- dozen.	11/- dozen.	15/- dozen.	
9d. packet.	1/- packet.	1/4 packet.	

TTF



4T

Fig. 1

GRADUATED GLASSES

(Unstamped).

1 oz.	2 oz.	4 oz.	6 oz.
5/9	6/8	9/6	10/10
6d.	7d.	10d.	1/- each.
8 oz.	10 oz.	16 oz.	20 oz.
12/7	13/6	16/8	18/6
1/1	1/2	1/5	1/8

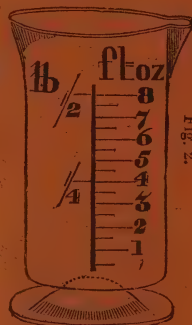


Fig. 2

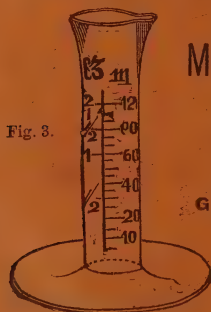


Fig. 3.

Minim Measures.

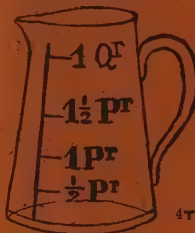
Conical or Cylindrical.
(Unstamped).

1 dr.	2 dr.
1/8	6/8
5d.	7d.

Glass Stirring Rods.

Spoon Ends.

2d., 3d., and 4d. each.



4T

GRADUATED GLASS JUGS

1 pt.	1 pt.	1½ pt.	1 qt.
13/6	17/1	19/-	22/9
1/2	1/6	1/8	1/11

"APTUS" ROCK LIGHT GAS LAMPS.

TTT

No. 1.—Special Value.

11½ × 6½ inches; Ruby
Glass and Fabric Screen,
square shape 6/6

No. 2.—D-shape Glass, 8×6,
outside Tap 8/6

No. 3.—Ditto; larger size 11/6

No. 4.—Extra large with 10×8
Ruby Glass and Fabric
in Front and Side Win-
dows 16/6



No. 1.—Lamp for oil, glass
5½ × 3½ square,
price 1/4

No. 2.—Lamp for oil, tri-
angle, two glasses,
7½ × 5, price 2/11



Up-to-date Patterns.

Lowest Prices.

Best Value.



No. 3.

SHARP & HITCHMOUGH, LIVERPOOL.

LAMPS.

No. 3, as woodcut, square, three sides glass, for oil. Size of glass, $6\frac{1}{4} \times 5$.

Price 2/-.

No. 4, as woodcut, new pattern, for oil. Glass, 4×4 . Square body.

Price 8/-.

TTT



No. 4.



No. 5.

No. 5, as woodcut, new pattern, for oil. Glass, $4\frac{1}{2} \times 4$. D-shape body, with eye shade.

Price 4/4.

CHEAP LAMPS from
6d. each, from

SHARP & HITCHMOUGH, Liverpool.

Watkins' Exposure Meters.

NEW AND IMPROVED PATTERNS.

New WATCH METER.

New Simple ACTINOMETER.

New HAND CAMERA CALCULATOR.

Watkins' Indoor Meter, 1/-**Wynne's Infallible Exposure
Meter, 7/6****The "APTUS" Tourist Photographic Compass**

ACTUAL SIZE.

THIS LITTLE INSTRUMENT will be found invaluable for ascertaining the best time of day for photographing any Building or Landscape.

Night-time may be utilised for prospecting and deciding as to the most opportune hour when the sun will fall upon the object at an angle of 45° . TTF

Full Instructions with each Instrument.

In Leather Pocket Case, price **3/-**
Postage 1d.

**"APTUS" DEVELOPING AND
PRINTING CABINET.**

TTF

In case, with divisions, containing 1 doz. $\frac{1}{4}$ plates, Ruby Lamp and light, 3 Dishes, 2-oz. Measure Glass, 1 Air-tight Tin, Hypo-Soda Developer for 100 plates, superior Printing Frame, packet Sensitised Paper, Gold Toning, and Light-tight Plate Box.

PRICE **10/6.** Postage 1/-

The above is all that is necessary for making
Negatives and Prints.

*Will Merchants and Shippers please
apply for Discounts to*



SHARP & HITCHMOUGH, LIVERPOOL.

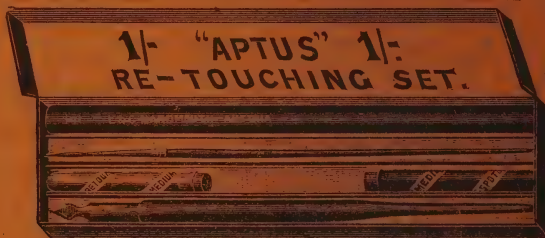
**RETAIL****2/6**

Postage

[3d.

TTF

CONTENTS.—2 Black Chalk Bromide Pencils, 1 White ditto, 1 Finest Quality Retouching Pencil, 1 Tube Retouching Medium, 1 Sable Spotting Brush (small), 1 ditto (larger), 1 Tube Spotting Medium, Print Trimmer and Retouching Knife.

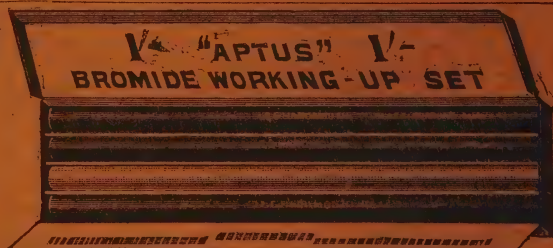
SPECIAL TERMS ON GROSS LOTS.

CONTENTS.—1 Retouching Pencil, 1 Tube Retouching Medium, 1 Tube Spotting Medium, 1 Print Trimmer, 1 Spotting Brush.

RETAIL**1/-**

Postage

2d.



CONTENTS.—3 Black Chalk Bromide Pencils, Nos. 1, 2, and 3; 1 White ditto.

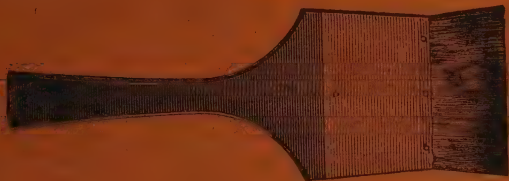
Wholesale from SHARP & HITCHMOUGH, LIVERPOOL.

PHOTOGRAPHIC BRUSHES.

FLAT CAMEL-HAIR DUSTING BRUSHES.

TTF

1 in. ... 3d. 2 in. ... 6d. 3 in. ... 9d. 4 in. ... 1/-
 5 in. ... 1/3 3 dozen on Card, assorted, 6/-



SPOTTING BRUSHES, WOOD HANDLE IN TIN.

2/8 per. dozen, 3d. each.

SABLE BRUSHES, IN TIN AND WOOD HANDLES.

Nos. 0, 3/6; ... 1, 4/-; ... 2, 5/9; ... 3, 7/6; ... 4, 9/9 per dozen.
 4d. ... 4 1/2d. ... 6d. ... 8d. ... 10d. each.



CAMEL-HAIR MOPS.

No. 1, 3d. ... No. 2, 4d. ... No. 3, 5d. each.



BRUSHES FOR CLEANING DEVELOPING DISHES, &c.

10d. each.

BEST TERMS FROM

SHARP & HITCHMOUGH,

LIVERPOOL.

All Prices in this List are subject to fluctuations of the Market.



MOUNTING BRUSHES.

Hog Bristles, in Metal
Polished Handles.

ON CARDS FOR DEALERS.

	No. 1.	No. 2.	No. 3.
Per dozen	3/6	4/-	4/6
Each	4d.	4½d.	5d.

TTT

HIGGINS' PHOTO MOUNTER.

Price 6d., 1s., and 2s.

TTT



THE "APTUS" NEW FLASH LAMP

Up-to-date Pattern.

MAXIMUM of LIGHT
WITH
MINIMUM of POWDER.

**The best cheap Lamp
ever made.**

Two or three may be
coupled together for large
Groups.

*Complete, with supply of
Powder,*

2/- ... postage, 2d.

TTT

Wholesale from SHARP & HITCHMOUGH, LIVERPOOL



"Aptus" Isochromatic Screens.

Mounted ready for use in Camera.

In Three Tints. TTF

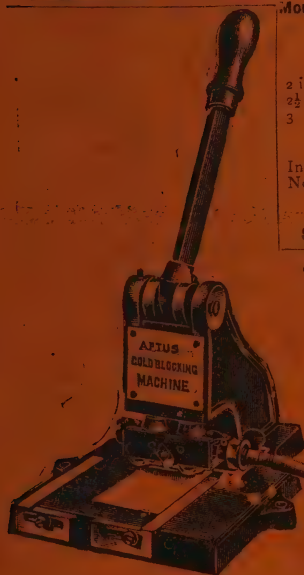
Screen only. Muntl.		
2 in. diam.	price 1/9	3/6
2½	" "	2/9 4/6
3	" "	3/9 5/6

Small sizes for Hand
Cameras from 1/-
Increase of exposure with
No. 1, about 2½ times.

Ditto, No. 2, about 5 times.

Ditto, No. 3, about 10 times.

Special Sizes and Fittings made to Order.



The "Aptus" Gold Blocking Machine.

For the use of Photographers, Ticket
Writers, Printers, &c.

Blind Blocking.

Gold Blocking.

Colour Blocking.

Bronze Blocking.

Full instructions with each machine.

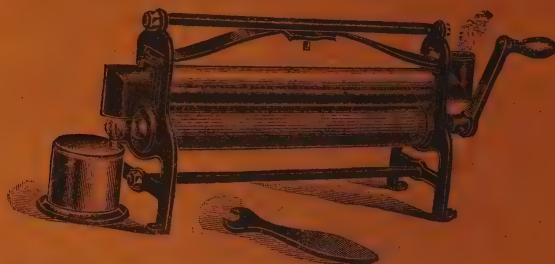
Brass blocks or electros may be used.

A saving of 50 per cent. by doing your
own work. Table space required—
only one square foot. TTF

Price £4 4s.

"Aptus" Enamellers

The "AMATEUR."



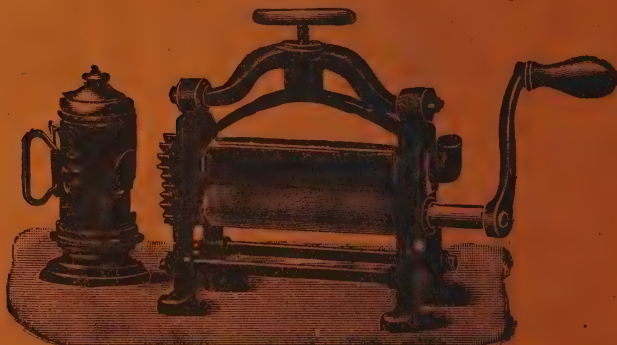
Handsomely finished and well made in every respect, and gives first-class finish to prints. Highly polished nickel plated Roller, spring and screw adjustment. Complete with spirit lamp and spanner, and packed in box.

6½ in. Roller

21/-

TTT

The "PROFESSIONAL."



A really beautifully made machine, with polished nickel plated rollers and fittings, adjustable spring and screw pressure. Giving highest possible burnish to prints. Complete with spirit lamp.

6½ in. Rollers

£1 10 0

10 in. Rollers

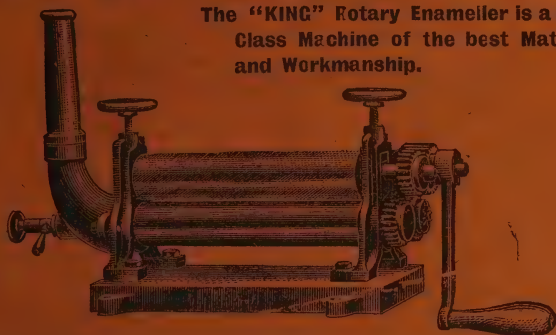
£2 10 0

TTT

PHOTOGRAPHIC GOODS AT WHOLESALE PRICES FROM
SHARP & HITCHMOUGH, LIVERPOOL.

THE "KING" ROTARY ENAMELLER.

The "KING" Rotary Enameller is a High-Class Machine of the best Materials and Workmanship.



The Top Roller is solid Steel, Nickel-plated ; it is lightly Milled so as to get a good grip of the Card.

The Bottom Roller is of Cold-drawn Steel ; it is Nickel-plated and highly polished, and is heated *internally* by our improved Bunsen Burner and Tube, or Spirit Lamp. The face of the Roller is always clean and free from moisture.

The Rollers are adjusted by a Hand Wheel at each end of the machine ; our "**Improved Adjustment**" prevents the Rollers coming in contact with each other, thus preserving their high polish. Our "**Improved Bearings**" allow the machine to take a thicker card than it is adjusted for, thus avoiding damage to itself or the card.

ALL PARTS ARE INTERCHANGEABLE AND NUMBERED. Duplicates can be supplied without returning the machine.

ALL THE GEARING IS MACHINE-CUT OUT OF THE SOLID, thus ensuring *easy* and *regular* running, and preventing the possibility of transferring the jarring marks on to the print, caused by the ordinary Cast Wheels.

BURNISHERS HEATED BY SPIRIT are supplied with Strong Brass Lamp.

EVERY BURNISHER IS TESTED BEFORE LEAVING OUR WORKS, packed in Wood Box, and guaranteed to give satisfaction.

NET PRICES.

WITH GAS BURNER OR SPIRIT LAMP.							
Size : Length of Rollers.	Duplex Gear.			Quadruplex Gear.			Box. TT
<i>Inches.</i>	£	s.	d.	£	s.	d.	
6½	1	5	6	1	16	0	} 1/6
8½	2	8	0	3	0	0	
10½	3	0	0	3	10	0	
12½	4	10	6	} 2/6
16	...	...	...	6	0	0
21	...	...	...	9	12	0

The Machines are always supplied with Gas Burner unless otherwise ordered.

TERMS—CASH WITH ORDER.

CARRIAGE FORWARD.

SHARP & HITCHMOUGH, LIVERPOOL.

"Aptus" Negative Naming Outfit.

Consisting of Divisioned Case containing



10/6

Postage
6d.
extra.

140 Letters, in Patent dovetailed rubber metal-bodied type
21 Figures.
10 Points.
45 Spaces.
1 Holder.
1 Tin of Ink.
1 Pair Tweezers,
and all necessary sundries, with full directions for Numbering and Naming Negatives.

TTF

PLEASE THAT our type is non-reversed, consequently it may be used for any kind of Printing on Paper, Wood, Cloth, and for endorsing Negatives.

NOTE - **MOREOVER** the Type can be obtained in many sizes. **OWING** to the Type being non-reversed it is not only cheaper but adapts itself for various purposes.

CARDS AND MOUNTS.

(Photographic.) FIRST QUALITY.

TT

Size.	Enamel Light & Dark with Plain Edges.		Gold Lines.		Real Gold Bevelled Edges. Enamel Light and Dark.	
	Doz.	100	Doz.	100	Doz.	100
C.d.V. ...	2d.	1/-	2d.	1/2	4d.	2/3
1/4-plate ...	3d.	1/6	4d.	2/-	5d.	3/-
Cabinet ...	5d.	3/-	6d.	3/6	7d.	4/6
1/2-plate ...	6d.	3/3	7d.	4/-	9d.	5/6
1/2-plate ...	—	—	—	—	1/6	10/-
Stereo 7 × 3 1/8	5d.	2/9	Grey Bristol. 3d.	1/9	7d.	(8 sheet) 4/6
Plain Grey Bristol Cabinets, 2/- per 100.						

A Large Variety of Cabinet Border Mounts.

Send 3/6 for sample 100, Assorted Designs.

SHARP & HITCHMOUGH, LIVERPOOL.

CARDS AND MOUNTS.

Plate-sunk, with Paste-down Tint and Impressed Border.

TT.

Size of Board.	Size of Tint.	Granulated.		Plain.	
		Per 100.	Per doz.	Per 100.	Per doz.
7 x 5 $\frac{1}{2}$	... 4 $\frac{1}{2}$ x 3 $\frac{1}{2}$	4/8	8d.	3/6	6d.
8 $\frac{1}{2}$ x 6 $\frac{1}{2}$	... 5 x 4	5/0	9d.	—	—
8 $\frac{1}{2}$ x 6 $\frac{1}{2}$	... 6 x 4 $\frac{1}{2}$				
10 x 8	... 7 x 5	7/6	1/0	5/0	9d.
12 x 10	... 9 x 7	10/0	1/6	8/0	1/2
15 x 12	... 10 $\frac{1}{2}$ x 8 $\frac{1}{2}$	17/6	2/6	11/0	1/6
18 x 14	... 12 x 10	—	—	17/6	2/6
20 x 16	... 13 x 11	—	—	25/0	3/6

TO PROFESSIONALS.

Ask for quotations. A special line of Whole-plate P. S. Mounts.

Grey Granulated Borders, Cream Tint, at 7/6 per 100. Cannot be equalled.

A great variety of Mounts in stock. Send us 1s. 6d. for parcel assorted, giving size required and style.

JAPANESE ART TISSUES.

New Designs.

TT

For Covering Photos. 1,000 in box, C.-D.-V., 1/6.; 1,000 in box, Cabinet, 3/6

TISSUE ENVELOPES.

Newest Designs, in various Colours.

TTF

C.-D.-V.	...	...	3/0 per 1,000	...	...	4d. per 100.
Cabinet	...	...	5/0	...	...	8d. "

"CAMEO" FRAME MOUNTS.

Grey Bristol Surface with White Line, White Bevel Centre and Edges Slip-in, Brown and Green.

Cut-out 3-in. circle,	8/6 100,	1/2 doz.	Cut-out 5x4 Oval.	11/0 100,	1/6 doz.
" 4 " "	11/0 " "	1/6 " "	$\frac{1}{2}$ Cushion	7/0 " "	1/0 " "
" 3x2 Oval	7/3 " "	1/0 " "	5x4	8/6 " "	1/2 " "
" 4x3	9/0 " "	1/3 " "			

Same as above, with Paste-down Centres.

TT

Tint, 3 $\frac{1}{2}$ inches diameter	...	...	7/6 per 100	...	1/0 per doz.
" 4 $\frac{1}{2}$ " "	...	...	10/0	...	1/4 " "

Good Selection of Circular Slip and Paste-on Mounts.

Cabinet Panel Mounts, 1/0 per doz. ... 7/0 per 100

All Prices in this List are subject to fluctuations of the Market.

CARDS OR SLIP-IN OR FRAME MOUNTS.

First Quality.

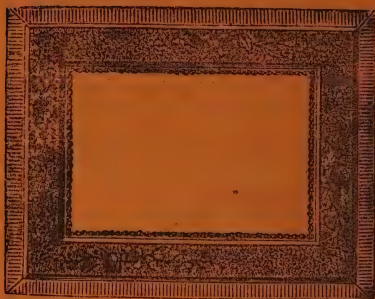


Fig. 2244.



Fig. 2245.

For unmounted Photos. Ivory White, Grey, and Brown Plastic with Ornamental Impressed Border.

	Size of Opening.	100.	Dozen.
Prom. Midget ...	$2\frac{1}{2} \times 1\frac{3}{4}$	3/9	6d.
Cabinet ...	$5\frac{1}{4} \times 3\frac{3}{4}$	7/6	1/-
Quarter-Plate ...	$3\frac{3}{4} \times 2\frac{1}{4}$	5/-	8d.
5x4 ...	$4\frac{1}{2} \times 3\frac{1}{4}$	6/-	10d.
Half-Plate ...	$6 \times 4\frac{1}{4}$	9/-	1/2
Bullet ...	3×3	5/-	8d.
C.-D.-V. ...	3×2	4/3	7d.

TT

A large variety of Slip-in Mounts in Stock at above prices.

Send for parcel, assorted, at 1/6, 2/6, 3/6, or 5/-. Full value given.

STATE SIZES REQUIRED.

MOUNTS FOR STAMP, GEM, AND VICTORIAS.

Low quotation for 10,000 and upwards.

❖ ALBUMS ❖

In vast variety from 9d. each.

SHARP & HITCHMOUGH,

101 & 103, DALE STREET,

LIVERPOOL.

Price for Developing Plates and Films.

TF

„ „ Printing in P.O.P. and Platinum.

Size.	Develop- ing Plates. Per doz.	Develop- ing Films. Per doz.	Printing, Toning, and Fixing P.O.P. glazed or matt, per doz.	Mounting <i>extra</i> . Cards extra as per list, per doz.	Plati- num Prints, per doz.	Toning and Fixing only, per doz.
PK 2 × 1½	—	1/6	1/6	3d.	2/9	10d.
FPK 3¼ × 2¼	C.D.V.	2/-	2/-		3/6	
B 2¼ × 2¼	—	1/6	1/6		3/6	
B 3½ × 3½	—	3/-	2/6		4/6	
1A 4¼ × 2½	—	3/-	2/3	4d.	4/-	1/-
1AFPK 4¼ × 3¼	2/6	3/-	2/6		4/9	
7 × 2½	—	3/6	2/3		4/6	
Z 5 × 4	3/-	3/6	3/-		5/6	1/4
6 × 4	3/-	5/-	5/-	6d.	6/-	
Cabt.	—	—			6/6	
½	—	—			8/9	
CK 7 × 5	—	4/-	5/6	9d.	9/-	1/8
7½ × 5	4/-	—			13/6	
1	5/-	10/-			17/6	
10 × 8	7/-	12/-			22/-	
12 × 10	11/-	14/-	14/-	1/-		4/6

We cannot undertake to mount customers' own prints at these prices.

Glazing extra same price as mounting.

ENLARGING AND FINISHING.

SIZE.	Price of Plain Enlarge- ments.	Finished in Black and White, extra.	Painted in Water Colours, extra.	Mounting in Cut Mounts.
12 × 10	2/6	5/- to 10/-	10/-	9d.
15 × 12	3/-	6/- „ 12/-	12/6	1/-
23 × 17	6/-	7/6 „ 15/-	20/-	1/3
24 × 20	8/6	10/- „ 20/-	25/-	2/-

Enlarged or Reduced Negatives made from
Prints or Negatives.

Transparencies, Copies, Enlargements,
&c., made at the lowest prices consistent with
high-class work.

T



DRY PLATES by leading Makers.

Dealers should ask for Terms to—

SHARP & HITCHMOUGH, LIVERPOOL.

P. O. P. & BROMIDE PAPERS.**ALL
MAKERS****AUSTIN-EDWARDS AND ILFORD FILMS.**

$\frac{1}{2}$ Ordinary $\frac{1}{6}$	Special Rapid $\frac{2}{6}$ Dozen.
5×4 $\frac{2}{6}$	" " $\frac{3}{6}$ "
$\frac{3}{8}$ $\frac{3}{8}$	" " $\frac{4}{6}$ "

KODAK FILMS ALL SIZES IN STOCK.**PLATINOTYPE PAPER.**

(In Sealed Tin Tubes.)

Size	plate	5×4	$\frac{1}{2}$ -plate	$\frac{1}{2}$ -plate	10×8	12×10	15×12	26×20	TF
No. of Sheets in Tube	24	24	24	24	24	12	12	3	
Price	$\frac{1}{6}$	$\frac{2}{3}$	$\frac{3}{6}$	$\frac{6}{-}$	$\frac{8}{6}$	$\frac{6}{6}$	$\frac{9}{6}$	$\frac{6}{6}$	
Postage	3d.	3d.	3d.	3d.	3d.	3d.	5d.	5d.	

FERRO-PRUSSIATE PAPER.

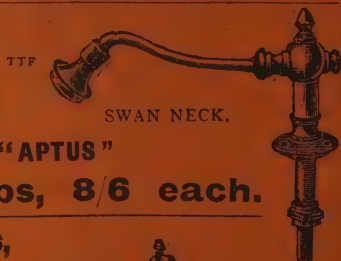
One Quality—only the Best.

11 yards by 30 inches ... $\frac{4}{8}$ | 11 yards by 40 inches $\frac{6}{-}$ Roll. TTF**"APTUS" FERRO-PRUSSIATE PAPER.**In Packets of 24 Pieces. No Developing, Toning, or Fixing.
White Lines on Deep Blue Ground. TTF $4\frac{1}{2} \times 3\frac{1}{4}$... 6d. $\frac{1}{2}$... 9d. Whole ... $\frac{1}{6}$ 10×8 ... $\frac{2}{-}$ per Packet.**ENGINEERING PHOTOGRAPHY.****BLACK LINE (WATER BATH ONLY).**

The Latest Process. The Cleanest Process. The Simplest Process.

The operation is the same simple procedure followed in taking Ferro-Prussiate Copies.
As supplied to the British and Foreign Governments.Roll, 11 yards by 30 inches $\frac{8}{-}$ | 11 yards by 40 inches ... $\frac{11}{-}$.

SWIVEL



SWAN NECK.

"APTUS"**Dark Room Taps, 8/6 each.****Dark Room Fittings,****Complete 22/6**Packing is extra. 19 in. \times 13 in. \times 5 in. Sink.Enamelled White inside, Black
Japan outside, fitted with waste
pipe and syphon, draining rack,
swan-neck rose tap. TTFThe Fittings may be had separately
as under:—

Developing Sink	9/6
Draining Rack	2/6
Syphon	2/6
Swan-neck rose tap, tested for main	8/6



"APTUS" PORTABLE DARK ROOMS.

THE illustrations below represent our now well-known Dark Rooms. These Dark Rooms are made in sections, so that in travelling they can be packed flat. The sections—six in number, consisting of four sides, a roof, and a



floor—can be easily put together in about five minutes. The roof is provided with a ventilator, while the floor is raised some two inches from the ground, so that a current of air is always circulating. Every board is tongued into its fellow. The fittings consist of shelves, a sink, 12×9 ins. (this size is suitable for developing up to half-plate), with a pipe to conduct the waste into a pail. A bench is provided on which to stand the odds and ends required. The window, glazed with ruby or orange glass, works in a groove, so that it can be opened at any moment for making exposures by contact, as Lantern Slides, Bromides, Opals, &c. Just below the window is a bracket on which to stand a lamp, thus dispensing with the necessity of having the heat and smell of the Lamp inside. TF

Size. F1—Flat Roof, and Space for Lamp. F2—Sloping Roof

Size.	F1—Flat Roof, and Space for Lamp.	F2—Sloping Roof
6-ft. 6-in. × 3-ft. 6-in. × 3 ft. 0 in.	2 4 0 ... 3 1 6	2 4 0 ... 3 1 6
6-ft. 6-in. × 3-ft. 6-in. × 3 ft. 6-in.	2 12 6 ... 3 12 6	2 12 6 ... 3 12 6
6-ft. 6-in. × 4-ft. 0-in. × 3 ft. 6-in.	2 19 6 ... 4 2 6	2 19 6 ... 4 2 6
6-ft. 6-in. × 4-ft. 0-in. × 4 ft. 0-in.	3 8 0 ... 4 15 0	3 8 0 ... 4 15 0

Stained and Varnished, 7/6 to 10/- extra.

SHARP & HITCHMOUGH'S Demonstration Tables and Portable Dark Rooms
for Photographic Societies, Lecturers, and Private Houses.

DARK ROOMS FITTED UP.

SCALES AND WEIGHTS.

In Oak Box, Strong Pans, Silk Cords.
Complete with Set, Grain and
Drachm Weights.

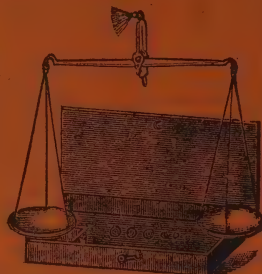
6-INCH BEAM. TT			
Brass Pans ...	2/4	Porcelain Pans ...	2/8
Glass " ...	2/7	Horn " ...	3/-

UPRIGHT SCALES.

Polished Oak Box with Drawer. Brass
Telescopic Pillar Stand, with Lever
raising Attachment. TT

6-in. Beam, Porcelain Pans, 6/8 complete with Weights			
7 " " " "	7/8	" " " "	" "
8 " " " "	9/6	" " " "	" "

Horn Pans, 1/- extra. Extra Weights, $\frac{1}{8}$ grain to 8 drachms, rs. per set.



LEVIATHAN

PURE CHEMICALS.

	1 oz.	$\frac{1}{4}$ -lb.	$\frac{1}{2}$ -lb.	1-lb.
Acid, Acetic Glacial, Solid, 50°	-/2	-/5	-/8	1/-
" ditto, in Winchester Quarts	...	...	...	-/11
" Citric, Cryst.	-/3	-/10	1/6	2/6
" Hydrochloric, pure	-/1	-/3	-/6	-/10
" Nitric, pure	-/2	-/5	-/8	1/-
" Pyrogallic (Schering's) 1 oz. bottles or compressed	1/-	...	...	...
" Sulphuric, pure	-/1	-/3	-/6	-/9
" Sulphurous	-/2	-/4	-/7	1/-
Alum, Powdered	7 lbs. 1/3	...	...	-/3
" Chrome, Crystal	-/2	-/5	-/8	1/-
Ammonia, Liquid, 880°	-/1	-/3	-/4	-/7
Ammonium, Bromide	-/3	-/10	1/6	2/6
" Carb., pure	-/2	-/6	1/-	1/9
" Sulphocyanide, in bottles	-/4	-/10	1/6	2/6
Collodion, Mawson's Negative	-/6	2/-	3/8	6/8
" 4 lbs., Winchester Quarts, 20/-	...	...	...	...
" Mawson's Enamel	-/4	1/3	1/9	3/-
Chalk, Prepared	-/1	-/1 $\frac{1}{2}$	-/2	-/4
" French	-/1	...	...	-/8
Copper, Sulphate	-/1	-/3	-/4	-/6
Eikonogen	1/2	...	...	...
Ferrous Oxalate	-/3	-/10	1/6	2/6
Gelatine, White, Gold Label	-/5	1/6	2/6	4/6
Glycerine, pure, colourless	-/2	-/6	-/9	1/6
Gold, Chloride (Johnson's). 15 grains 1/9	...	...	...	...
" 1 dozen tubes, 20/-	...	...	...	...
Hydrokinone, pure, in bottle	-/10	3/-	5/6	10/6
Indiarubber Solution, in bottle, 1/-	...	...	...	...
Iron, Sulphate	-/1	-/1 $\frac{1}{2}$	-/2	-/3
Kaolin	-/1	-/2	-/3	-/4
Litmus, Red and Blue. Per book, 2d.; per doz. 1/6	...	...	...	...

Special quotations for large quantities, from

SHARP & HITCHMOUGH, LIVERPOOL.

PURE CHEMICALS.

	1 oz.	½ lb.	½ lb.	1 lb.
Magnesium Ribbon— $\frac{1}{4}$ oz. 6d. ; $\frac{1}{2}$ oz. 1/- ; per yard, 1d. ...	2/-	...	...	...
" Powder (Schering's) in bottles ...	1/6	5/6	10/6	20/-
Potass., Chloro-Platinite, 15 grains, 2/- ; 60 grains, 7/9 ...	...	...	...	...
" Carbonate, pure, dry (in bottles) ...	-4	-7	-11	1/5
" Caustic, in sticks, pure ...	-4	-8	1/4	2/-
" Bichromate ...	-2	-5	-8	1/-
" Nitrate (Needle's) pure ...	-2	-4	-6	-10
" Ferricyanide (Red) ... (in bottle) ...	-6	...	...	...
" Ferrocyanide (Yellow) pure ...	-4	...	...	...
" Oxalate, Neutral ... 7 lbs. 5/-	-1	-3	-5	-9
" Meta-Bisulphite ... (in bottle) ...	-5	1/2	2/-	2/9
Potassium, Bromide ...	-5	1/2	1/9	3/2
" Iodide (variable) ...	1/3	...	...	...
Silver, Nitrate, best ...	2/3	...	...	...
Soda, Acetate, pure ...	-1	-3	-5	-9
" Carbonate, pure crystals ...	-1	-3	-5	-9
" Hydrate, Sticks (in bottle) ...	-4	-8	...	...
" Hyposulphite, 7 lbs. 1/-, 14 lbs. 1/9, cwt. 10/6	...	...	...	-2
" Granulated ... 1/2, ... 12/6	...	...	...	-3
" Phosphate ...	-2	-5	-8	1/-
" Sulphite, pure crystals ... cwt. 15/-	-1	-3	-5	-8
Tungstate ...	-3	-9	1/4	2/6

BOTTLES.

1 oz. Cork, -/1	Box Corks, -/2	Stoppers, -/3
2 oz. " -/1	" -/2	" -/3
4 oz. " -/2	" -/2	" -/4
5 oz. " -/2	" -/3	" -/4
8 oz. " -/3	" -/4	" -/5
10 oz. " -/3	" -/4	" -/6
16 oz. " -/4	" -/5	" -/6
20 oz. " -/4	" -/6	" -/8

WINCHESTERS.

Cork, 4 lbs. ... -/10	Stopper, 4 lbs ... 1/-
" 5 lb. ... 1/-	" 5 lbs. ... 1/3

TINS.

½-gall. ... 1/-	2 gall. ... 2/-
1 lb. " 1/4	3 " 2/8
1 lb. Tins for Hypo, 1/6 dozen.	TTT

7-lb. AIRTIGHT TINS FOR HYPO, &c., 8d. each, 7/- doz.

1-lb. " " " 2d. " 1/6 "

AMIDOL.—In tins of 1 oz., 2/- ; 4 oz. 7/6 ; 8 oz. 15/-.

EIKONOGEN.—In tins of 1 oz. 1/2 ; 4 oz. 3/6.

RODINAL.—In bottles of 3 ozs. 1/6 ; 8 ozs. 3/-.

TT

METOL.—In tins of 1 oz. 2/6.

FIXING CARTRIDGES.—10 Cartridges, 1/9.

TONING AND FIXING CARTRIDGES.—In boxes of 10, 3/9.

JOHNSON & SON'S DEVELOPERS IN TUBES, 4d. each.

BURROUGHS, WELLCOME & CO.'S TABLOIDS, 6d. & 1/-.

Special quotations for large quantities from

SHARP & HITCHMOUGH, LIVERPOOL.

"APTUS" SPECIALITIES.

Bottles may be sent by Parcels Post when packed in our new Safety Cases. TTT

"APTUS" NEGATIVE RETOUCHING MEDIUM, in 1-oz. bottles, 6d., post 8d.

"APTUS" SULPHO-PYROGALLOL DEVELOPER. Brilliant and clean.

Negatives always obtainable by this developer. Great latitude in exposures. Results cannot be equalled by any other formula. Sold in 5-oz. bottles, 1/-, by post 1/4; 15-oz., 1/10, by post, 2/5; 5-oz. Stock Solution for above, 6d.

"APTUS" HYDROQUINONE DEVELOPER. A new and improved formula.

Two solutions. 10-oz., 1/-, by post 1/5; 20-oz., 1/10, by post 2/5; 40-oz., 3/-, by post 4/2. Enough for 100 to 200 plates. Very quick in action. Specially suitable for Lantern transparencies.

"APTUS" HYPO-ELIMINATER. Whatever you do, have a bottle of the Hypo-

Eliminator at once. It saves valuable time.

WHAT IT WILL DO.—It will eliminate every trace of Hyposulphite of Soda from your prints and plates in five minutes. It will disinfect the dark room, &c. A bottle of this should be in the hands of every amateur and professional photographer. 10-oz. bottle, 1/-, by post 1/5; 20-oz., 1/10, post 2/5; 40-oz., 3/6, post 4/2.

OPTICAL DEAD BLACK.

3-oz. Square Bottles, For Inside of Cameras,

Boxwood top to corks, Lenses, &c.

1/- Postage 2d. Dries without Heat on Wood, Brass, Leather, &c.

"APTUS" NEGATIVE VARNISH, 2-oz., 6d., by post 8d.; 5-oz., 1/-, by post 1/3;

10-oz., 1/6, by post, 1/10d; 20-oz., 2/6, by post 3/-

"APTUS" P.O.P. TONING. Gold and Sulpho-cyanide in separate tubes to make 10-oz. of Toning. Packed in neat card box, 6d., by post 7d.

THE CRESCO-FYLMA ENLARGING SOLUTIONS.

THIS marvellous process, by its simplicity, perfect action, and cleanliness, will revolutionise dry-plate photography. The operator can enlarge in full daylight, and has the mysterious delight of seeing, in the course of a few minutes, his half-plate *grow* to double its area. This takes place without risk or distortion, and the artist will observe that the enlarged film appears to have *gained* in detail, and yet to have lost none of its tones or values. TTF

CRESCO-FYLMA POWDERS.

Price 6d. per packet, post free 7d.

TTT Only require mixing with water for use.

URANIUM INTENSIFIER.

6-oz. Bottle, 1/-.

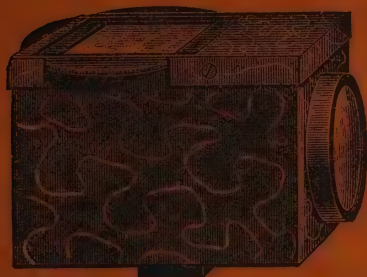
Rubber Finger Stalls, to keep your fingers clean, 3d. each. TTT

All Prices in this List subject to fluctuations of the Market.

SHARP & HITCHMOUGH, Photographic Speciality
Manufacturers,
LIVERPOOL.

"Aptus" View Finders.

TTF



The "Lustre."

4/6 each. Postage zd.

With Rotating Diaphragm showing vertical and horizontal view.

Special Shape for Hand Camera.

Giving Brilliant Image in full sunlight.

3/- each.

Larger size, suitable for Stand Camera, 6/6 each.

Ordinary Hand Camera Finders.

Brilliant and Reflecting, Superior Quality, 1/- each.

TTT

New Adjustable Vignetter.

PATENT APPLIED FOR.

The **New Adjustable Vignetter** can be used with any ordinary printing frame, and in no way interferes with its use when Vignettes are not required. It can be immediately attached or detached, without sticking or pinning. **REMAINS SECURE IN ANY POSITION.** *A great saving of time to professionals.* Clipped by Aluminium slides, allowing of adjustment up and down or sideways and by means of Metallic grooves the Vignetting card can be placed nearer or farther from negative, and at an angle; or immediately changed for another card of different size opening, producing in a few minutes a Vignetted Print of the greatest excellence. Will Vignette any part of negative desired.



PRICES, including Aluminium Slides, and 12 Vignetting Cards (6 with openings of different sizes, and 6 for cutting as desired)—1-plate, 2/-; 1-plate, 2/6; 1-1-plate, 3/6.

Instructions for Use enclosed with each Vignetter.

TTF

Zinc Vignettes.

6 Quarter-plate	...	...	...	2/9	Each	-/6
3 Half-plate	...	...	...	2/5	"	-/10
3 Whole-plate	...	...	...	4/6	"	1/6

TTF

Vignetting Glasses.

Size.		Pear, Oval, and Cushion.	
4 1/2 x 3 1/2	...	8/- per Doz.	-/9 each
6 1/2 x 4 1/2	...	16/-	1/4 "
8 1/2 x 6 1/2	...	23/-	2/- "

TTF

X3



Prices of Camera Brass-work

TTF

1.	Runner Strips for Camera Backs ...	Rough, per inch, 1d.; Finished, 1½d.
2.		
3.		
4.	Swing Back Slot Plates ...	each, 1d.; " 3d.
5.		
6.	Rising Front Slot Plate ...	" 2d.; " 4d.
7.		
8.	Double Hinge for 12×10 or 10×8 Focussing Frame ...	Rough, per pair, 6d. Finished " 1s.
9.		
10.		
11.	Ear Plate for Tripod Legs, per set of 6 ...	Rough, 6d.; Finished, 1s.
12.		
13.		
14.	Turn Button for Tripod Legs ...	Rough, 1d. each; Finished, 2d.
15.		
16.	Panel Plate ...	1d. " 2d.
17.	Double Hinge for ½ and ¾-plate Focussing Frame ...	Rough, per pair, 5d. Finished, 10d.
18.		
19.		
20.	Tripod Stand Plates ...	Rough, 2d. each; Finished, d. each.
21.	Angle Plates ...	Rough, 3d. each; Finished, 6d. each.
22.	Double Hinge for ½ and 5×4 Focussing Frame ...	Rough, per pair, 4d. Finished, per pair, 8d.
23.	Dark Slide Clip Hinge for 12×10 and 10×8	Rough, per pair, 4d.; Finished, 8d.
24.		and under " 2d.; " 4d.
25.	Bridges for Leather Handles ...	per pair, 2d.
26.	Snap Spring for Hand Camera, blacked ...	4d. each
27.	Plates for Snap Spring for Hand Camera, blacked ...	pair, 2d.
28.		
29.	Hooks for Tripod Leg or Box Lid ...	Rough, pair, 2d.; Finished, 4d.
30.	Hook with Lug ...	3d.; " 6d.
31.	Turn Button for Tripod Leg ...	" 2d.; " 4d.
32.	" for D Slide ...	each 1d.; " 2d.
33.	Hinge Pull-off Joint ...	per pair, 3d.
34.		
35.	Bridges for Camera Handles ...	pair, 1½d.
36.	Piano Hinges for Hand Camera Doors, polished, 4½ in. ...	6d. each.
37.	Hinge for Tailboard ...	Rough, per pair, 5d.; Polished, 10d.
38.	Angle Plate with Hook for Reversing Back ...	pair, 4d.
39.	Slot Plate for Rising Front ...	Rough, per inch, 2d.; Finished, 4d.
40.	Hinge for Tailboard ...	Rough, per pair, 4d.; Finished, 8d.
41.	Hinge for Dark Slide, 1½ in. ...	3d.
42.	Springs for Printing Frames ...	per pair ½, 3d.; ¾, 4d.; 1, 8d.; 10×8, 10d.; 12×10, 1s. 3d.
43.	Hinge for Dark Slide, 1 in. long ...	per pair, 2d.
44.	Slot Plates or Side Struts, 4 in. long ...	Rough, 3d.; Finished, 6d.
45.	" " 6 in. ...	4d.; " 8d.
46.	Brass Washer ...	6d. per doz.
47.	" " ...	5d. " 4d.
48.	" " ...	4d. " 1d. each
49.	" Loop for Leather Handle ...	per pair, 2d.
50.	" Hooks ...	1d. each
51.	" " ...	1d. each
52.	Turn Button, Thick and Thin, for Carriers, &c. ...	6d. per doz.
53.	Hook for Box &c. ...	1d. each; 9d. doz.
54.	Eyelet for Finder Lens ...	1d. each
55.	Bezel for Finder Lens ...	2d. each
56.	Eyelet for Front of H Camera ...	2d. each
57.	Bezels for Lenses ...	from 3d. each
58.		
59.	Ivory Numbers for D Slides ...	2d. each; 1s. 6d. doz.
60.	Screw Pins for Dark Slides ...	1d. each; 9d. doz.
61.	Slot Plate ...	2d. each
62.	Hinge for Tailboard ...	pair, 3d.; Finished, 6d.
63.	" for Dark Slide ½ in. ...	pair, 1½d.
64.	Corner Plate for Slides ...	" 2d.

SHARP & HITCHMOUCH, Brassfinishers and Manufacturers.

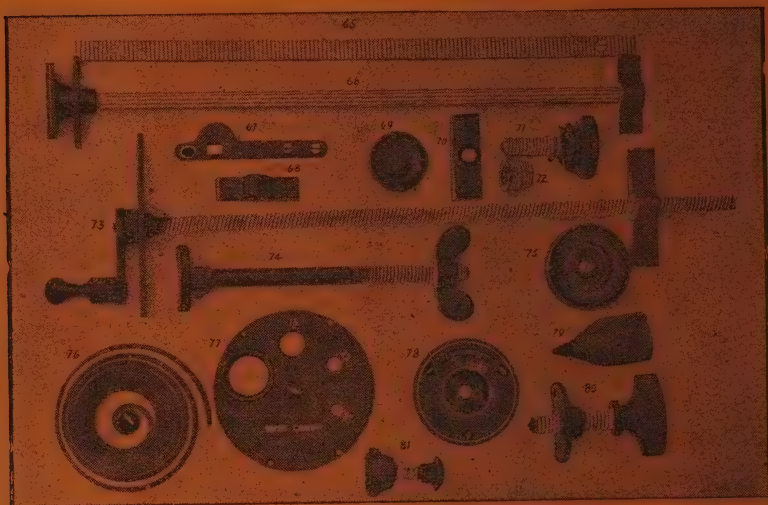
Quotations for Wholesale Quantities.

Brass Screws in stock 00×½ in. upwards.

CAMERA FITTINGS—Half Size.



CAMERA BRASS WORK.



TTF

- | | | |
|-------|--|------|
| 65. } | Rack and Pinion Set, special sizes to order, $\frac{1}{4}$ -plate, 3/-; | |
| 66. } | $\frac{1}{2}$ plate, 4/6; $\frac{3}{4}$ -plate, 6/6; 1° 10/6; $1\frac{1}{2}^{\circ}$... | 12/6 |
| 67. | Spring Snap for Dark Slides, pair | 4d. |
| 68. | Bearings for Pinion, flat each... | 4d. |
| 70. | " " end lacquered, each | 6d. |
| 69. | Set Screw, Milled Head, $\frac{1}{2}$ in. diam., 4l.; $\frac{3}{8}$ in. diam., 5d.; | |
| | $\frac{1}{4}$ in. diam., each | 6d. |
| 71. | Milled Head Screw, $\frac{1}{2}$ -in. diam., 5d.; $\frac{3}{8}$ -in., 6d.; $\frac{1}{4}$ -in. diam. each | 7d. |
| 72. | Plug Bush Receiver, each | 2d. |
| 73. | Focussing Screw, folding winch handle, $\frac{1}{4}$ -plate, 2/6; $\frac{1}{2}$ -plate, | |
| | 4/-; $\frac{3}{4}$ -plate, 6/6; 1° , 8/6; $1\frac{1}{2}^{\circ}$ -plate | 10/6 |
| 74. | Bolt and Wing Head for Tripods, &c., 2 in. long, 3d.; $2\frac{1}{2}$ in. | |
| | long, 5d.; $3\frac{1}{2}$ in. long, 6d.; $3\frac{1}{2}$ in. long, each | 8d. |
| 75. | Milled Head for Pinions, with cone nut, $\frac{3}{8}$ in. diam., 6d.; $\frac{1}{2}$ -in. | |
| | diam., 8d.; $\frac{3}{4}$ in. diam., 10d.; 1 in. diam., 1/-; $1\frac{1}{2}$ in. diam. ea. | 1/2 |
| 76. | Spiral Spring for Hand Camera... | 4d. |
| 77. | Diaphragm, rotating " | 9d. |
| 78. | " Iris, cheap quality, 1/6; best | 2/- |
| 79. | Brass Toe Caps for Tripod legs, set 3, $\frac{1}{2}$ in. diam., 3d.; $\frac{3}{8}$ in. | |
| | diam., per set... | 4d. |
| 80. | T-Screw for Tripod, with plate receiver | 10d. |
| 81. | Bolt and Milled Head, for swing back, $\frac{1}{4}$ -pl., 8d.; $\frac{1}{2}$ -pl., each | 10d. |

Camera Brass Work

TTF						s.	d.
Pinion Wire, $\frac{1}{4}$ " dia. ... }	...	...	...	...	per inch	0	2
Rack, Flat or Edge Cut }	...	...	...	...	" "	0	2
Pinion Wire, $\frac{5}{16}$ " dia. ... }	...	...	...	...	" "	0	2½
Rack, Flat or Edge Cut }	...	...	...	...	" "	0	2
Extension Rods for front of camera, fitted with milled heads and feet ... per pair, 7" long, 1/4; 8" long, 1/6; 10" long,						1	8
Tubing, seamless brass, drawn, various diameters					per lb.	2	1
Tripod Tops, triangle ... each, $\frac{1}{4}$, 2/6; $\frac{1}{2}$, 3/-; $\frac{3}{4}$,						4	0
Dark Slide Grooving, book form ...					per foot	0	8
Guide Plates for travelling part of camera...					per pair	2	0
Wood Grooving for plate boxes, 11" wide ...					per foot	1	0
Flanges for $\frac{1}{4}$ and $\frac{1}{2}$ -pl. R.R. Lenses, to order only ...					each	2	0
Brass Adapters, for fitting two sizes of lenses ...					from	3	0
Springs for Printing Frames ... per pair, $\frac{1}{4}$, 3 1/2; $\frac{1}{2}$, 4d.; $\frac{3}{4}$,						0	8
Plate Release, with Indicator, for magazine hand camera,					each, $\frac{1}{4}$ -plate, 2/-; 5 x 4,	2	6
Morocco or Seal Grain Material, for covering hand cameras,					$\frac{1}{4}$ -plate, 2/-; 5 x 4,	2	6

Sharp & Hitchmough will quote special prices for Brasswork and Woodwork in quantities, as they have facilities for turning out first-class work at reasonable prices.

CAMERA REPAIRS A SPECIALITY.

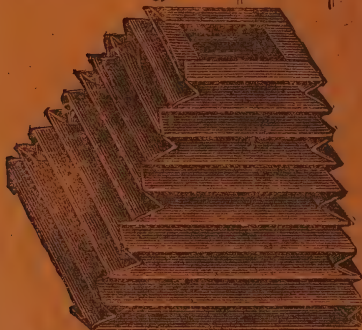
101 and 103, DALE STREET, LIVERPOOL.

"APTUS" CAMERA BELLOWS

(TO ORDER.)

State when Ordering
if Parallel or Taper.

POSTAGE EXTRA.



Suitable for Camera:	Length Extended.	Square Outside.	Oblong Outside.	Best Varnished Maroon Leather, Square or Oblong.	Unvarnished Leather, Square or Oblong.	TTF
Quarter-plate...	7 inch	4 1/4 x 4 1/4	4 1/4 x 3 1/4	In ordering give size out- side at back and front, with length required.
5 x 4	9 "	5 1/4 x 5 1/4	5 1/4 x 4 1/4	2/4	1/8	
Half-plate	12 "	7 1/4 x 7 1/4	7 1/4 x 5 1/4	2/8	2/4	
Ditto	14 "	7 1/4 x 7 1/4	7 1/4 x 5 1/4	5/8	4/4	
Whole-plate	18 "	9 1/4 x 9 1/4	9 1/4 x 7 1/4	5/8	5/8	
Ditto	22 "	9 1/4 x 9 1/4	9 1/4 x 7 1/4	9/4	8/4	
10 x 8	22 "	11 1/4 x 11 1/4	11 1/4 x 9 1/4	11/8	10/8	In ordering please state if Taper or Parallel Bellows is required.
12 x 10	26 "	13 x 13	13 x 11	16/8	12/8	
15 x 12	30 "	16 1/4 x 16 1/4	16 1/4 x 13 1/4	19/8	16/8	
				25/8	22/8	

N.B.—Figures in third and fourth columns represent the outside measurement of Bellows when closed.
Odd sizes charged 10 per cent. extra.

SHARP & HITCHMOUGH, LIVERPOOL.

Telegrams: "APTUS FINDER," Liverpool. Telephone No. 2495.

CARRIERS OR INNER FRAMES.

Outside	5 x 4	3-plate	1-plate	10 x 8	12 x 10	15 x 12
Inside	4-plate	1 or 5 x 4	2-plate	1-plate	10 x 8	12 x 10
Thin for single plate in Double Slide	9	1/-	1/3	1/6	2/-	26
Thick for two plates in Solid Slide...	9	1/-	1/3			
With Sterling Silver wire corners for wet plates	2/-	26	3/-			176
Special Sizes to order. Postage extra.						



"APTUS" TURNTABLES OR TRIPOD HEADS,

Dispensing with Loose Triangle and Screw.

1-plate, 4/6 1-plate, 5/6 1-plate, 7/-
Postage -3

LARGER SIZES TO ORDER.

Fitting to Camera extra,

ACCORDING TO SIZE. TTT

9^D. STITCHED CAMERA HANDLES



in the following colours and sizes :-

9d. each. Black, Nut Brown, Saffron, and Russet, 4 1/4, 4 3/4, and 5 1/4 inches.

Six Handles on Card, complete with screws, at 4/6 per Card ; Six Cards at a time, 4/- each Card ; Twelve Cards at a time, 3/9 each Card.

6^D. Strong Solid Leather Handles and Fittings,

6d. each. In Black or Tan. Six on Card, assorted, 3/-

TTT

SHARP & HITCHMOUGH

Undertake repairs of all kinds in wood and brass.

Experienced workmen on the premises at

103, DALE STREET, LIVERPOOL.

PULP SLABS (Highly Polished). TTT

8×5, 1/- 10×8, 1/6 12×10, 2/- 14×12, 2/9

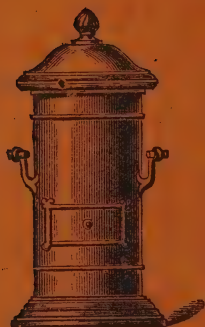
ENAMELLING SLABS FOR P.O.P.

Ferrottype ... 7×5 in. 2d. each; 10×7, 4d.; 14×10, 6d.

Packing and post on the latter size, 6d.; smaller sizes, 3d. TTT

The - -

CARBOTRON STUDIO STOVE.

Heating power,
1,000 cubic feet,

£1 3 6

No Smoke or Smell.
No Fumes.
No Flue or Chimney
required.

No Dirt.
For Studios and
Dressing Rooms.
For Conservatories.
For Shops & Offices,

&c.

TT

Heating power,
1,200 cubic feet,

£1 5 0

Carbotron Fuel in 1 cwt. Boxes,
17/6

If you do not find in this Catalogue what you require please
write to

SHARP & HITCHMOUGH,

Manufacturers of Photographic Apparatus to the Wholesale Trade,
LIVERPOOL.

"APTUS"



ACCESSORIES.

TO ORDER.



	TT
Pedestal - -	20s.
Brazier - -	4s.
Gate - - -	25s.

RUSTIC STYLE,
15s.

OAK CHEST,
3 ft. x 15 in. x 15 in.,
15s.

SPECIAL DESIGNS TO ORDER.

Grass Mats at 5d. per square foot.

ANY SIZE TO ORDER.

TTT

SHARP & HITCHMOUGH,
101 and 103, Dale Street, LIVERPOOL.

POSITIVE STOCK.

FERROTYPE PLATES.

TF

"Special" Buffalo, 14×10, Black or Chocolate, per doz., 3s. 6d.; per box of 200 Sheets, 32; half-box, £1 1s.; quarter do., 11s.

AMERICAN FERROTYPE PLATES CUT UP.

Per box of 8 dozen, Black or Chocolate, $2\frac{1}{2} \times 2$, 1s. 6d.; $3\frac{1}{4} \times 2\frac{1}{4}$, 2s. 6d.; $4\frac{1}{4} \times 3\frac{1}{4}$, 4s. per box.

GLASS.

Per gross.

$\frac{1}{4}$ size ($2\frac{1}{2} \times 2$)	...	...	...	0s. 10d.
$\frac{1}{2}$ " ($3\frac{1}{4} \times 2\frac{1}{4}$)	...	...	...	2s. 0d.
$\frac{3}{4}$ " ($4\frac{1}{4} \times 3\frac{1}{4}$)	...	...	...	3s. 6d.

MATS AND PRESERVERS.

T

size	Per Gross	$\frac{1}{2}$ gross.	Per doz.
$\frac{1}{4}$ size ($2\frac{1}{2} \times 2$)	...	3s. 0d.	1s. 6d.
$\frac{1}{2}$ " ($3\frac{1}{4} \times 2\frac{1}{4}$)	...	4s. 3d.	2s. 2d.
$\frac{3}{4}$ " ($4\frac{1}{4} \times 3\frac{1}{4}$)	...	7s. 8d.	3s. 11d.

CASES.

Doz.

$\frac{1}{4}$ size ($2\frac{1}{2} \times 2$)	...	...	...	1s. 6d.
$\frac{1}{2}$ " ($3\frac{1}{4} \times 2\frac{1}{4}$)	...	...	...	2s. 0d.
$\frac{3}{4}$ " ($4\frac{1}{4} \times 3\frac{1}{4}$)	...	...	...	4s. 6d.

TRAYS.

Gross.

Doz.

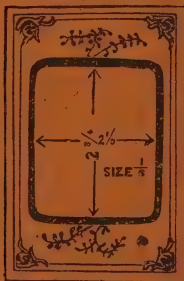
$\frac{1}{4}$ size ($2\frac{1}{2} \times 2$)	...	...	...	5s. 0d.	0s. 6d.
$\frac{1}{2}$ " ($3\frac{1}{4} \times 2\frac{1}{4}$)	...	...	...	6s. 6d.	0s. 7d.
$\frac{3}{4}$ " ($4\frac{1}{4} \times 3\frac{1}{4}$)	...	...	...	10s. 6d.	1s. 0d.

FERROTYPE ENVELOPES (New Designs).

TTF

$\frac{1}{4}$, $\frac{1}{2}$, and $\frac{3}{4}$ size, oval, dome and cushion	...	100	1s. 4d.	...	1000	11s. 0d.
5×4	...	...	2s. 0d.	...	...	18s. 0d.
Victoria, $\frac{1}{4}$	...	...	1s. 3d.	...	...	10s. 6d.

Special Quotations for large orders of Envelopes and Positive Glass.



"Aptus" Photographic Soap removes all Stains
from Hands. TABLETS: 3d. Plain, 4d. Scented.

Catalogue of Mounts on Application.

SHARP & HITCHMOUGH,

101 and 103, Dale Street, Liverpool.

ACETYLENE GAS GENERATOR

For the LANTERN
and

70/-

HOUSEHOLD
USE.

Description of Generator.

This Generator is made on the Carbide to Water principle, which is recognised by all the highest authorities to be the best and safest, as the gas is cooled and cleansed from impurities as it rises through the water.

The working of the Generator is absolutely automatic, it has no valves to stick or get out of order.

To start the Generator turn on tap A, to stop it shut it off.

This size will run a 50-C.P. burner for seven to eight hours; or the triple magic lantern burner, No. 210, for which it has been specially adapted, about $4\frac{1}{2}$ hours.

Can be made any size to order.

Triple Magic

Lantern Burner,
Equals Lime Light.

TTT

The two outside burners can be shut off when not required.

No. 210, without Tray,

Price **31/3** each.

No. 210T, with Tray, as shown,

Price **33/-** each.

Full Particulars of Larger Apparatus from

Sharp & Hitchmough,
Liverpool.

THE NEW VAPOUR INCANDESCENT LIGHT FOR THE LANTERN,

28/-

TTT

CONDENSERS (Compound)

TTT

4 in. diam. ...	£0 6 6	6 in. diam. ...	£1 10 0
4 $\frac{1}{4}$ " ...	0 3 6	6 $\frac{1}{2}$ " ...	2 0 0
5 " ...	1 0 0	8 $\frac{1}{4}$ " ...	3 0 0
5 $\frac{1}{4}$ " ...	1 2 6	10 " ...	5 10 0

Mounted in Brass of Best Quality.

SHARP & HITCHMOUGH, LIVERPOOL



"APTUS"
**SELF-LIFTING
 CARRIERS,**
 1/6 and 2/- each.

"APTUS" TTT

LANTERN SLIDE BINDING VICE.

For firmly holding the slide and cover glass in position while applying the binding.

Price 1/- each. Post 2d.



Something New !

Patent
 applied for.

LANTERN SLIDE CARRIER.

THE Chief Advantage of this Carrier is that the Slides are *Inserted and Withdrawn from one Side of the Lantern*, thus enabling one Operator to attend to the Slides with ease and comfort.

No Reaching over the LANTERN TO WITHDRAW SLIDES.
 Thick or thin Slides are held in perfect register.

An effect almost equal to dissolving is obtained with this Carrier.

The Slides are easily inserted and withdrawn.

No friction to wear away the binding on the slide.

TTT

To use the Carrier it is first put in the Lantern in the usual way. The Slide is inserted and the runner pushed along and withdrawn. The next slide is then put in the Carrier and the operation repeated, the action of withdrawing the runner bringing the slide shown with it, and leaving the second one, the whole being accomplished with a pleasing dissolving effect. **Each Carrier neatly packed in box.**

PRICE 4/- Postage 3d.

WELDLESS STEEL CYLINDERS FOR COMPRESSED GASES,

Tested up to 2 tons to the square inch, fitted with Improved Valves.

Contents in Cubic feet.	Price including Valves, &c.	Bags.	Price of Oxygen and Hydrogen.	Contents in Cubic Feet.	Price including Valves, &c.	Bags.	Price of Oxygen and Hydrogen.
6 ...	26/6	3/6	4d. per foot.	15 ...	31/-	5/-	4d. TF per foot, 3d.
10 ...	23/-	4/-		20 ...	33/-	5/6	
12 ...	29/6	4/6		30 ...	43/-	6/6	

We keep in stock Cylinders, Valves, Nipples, Unions, Regulators, Gauges, and Keys.
Red and Black Tubing, very thick, 4d. and 5d. per foot.

HYMN SLIDES, 8d. EACH.

WITH ORNAMENTAL BORDER.

TTF

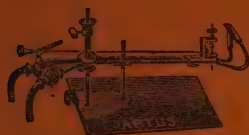
Catalogue Free by Post.

LANTERN BOXES.



To hold 24 Slides in grooves	...	...	...	...	1/4 each,
" 36 " "	...	...	...	...	1/5 "
" 50 " "	...	...	...	...	1/6 "

INJECTOR JET, 30/-



"APTUS" CENTREING JET TRAY.

— VERY SIMPLE. — TTF

6/-

May be used with any ordinary Jet.

SHARP & HITCHMOUGH. Designers and Manufacturers.

LIVERPOOL.

"Aptus" Optical Lanterns

IN ALL
QUALITIES

FROM A

Full-sized Lantern

WITH

4-inch Condenser and Lamp,

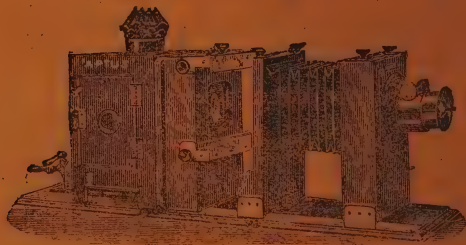
AT

16/6

TO THE

HIGHEST CLASS

Science = Lanterns.



**SHARP & HITCHMOUGH, Manufacturers,
LIVERPOOL.**

PORTABLE ELEVATORS,^{TTT}

Up to 8 feet, 8s. 6d. each; 12 feet, 15s. 6d.; fitted with top rail for soft Calico Sheets.

WHITE CALICO SHEETS:

TTT

8 x 8 feet ...	£0 12 0 each	12 x 12 feet ...	£1 3 6 each
10 x 10 „ ...	0 18 0 „	14 x 14 „ ...	1 17 6 „

OPAQUE LANTERN SHEETS.



Prepared with Pure White, Flexible,
Opaque Surface. Mounted on Roller,
Batten, Cord, and Pulleys.

8 ft. x 8 ft. ...	22/-	10 ft. x 10 ft. ...	31/6
9 ft. x 9 ft. ...	25/-	12 ft. x 12 ft. ...	44/-

*To be obtained from all Wholesale and
Retail Dealers, or from the Makers,*

Sharp & Hitchmough,
LIVERPOOL.

APTUS

THE ABOVE IN LARGER SIZES.

TTT

14 x 14 feet, 61/3; 15 x 15 feet, 70/6; 16 x 16 feet, 79/-

Samples on Application.

SHARP & HITCHMOUGH, Makers,
LIVERPOOL.

UP TO DATE.

The Very Latest Novelty for 1903.

USEFUL IN SUMMER OR WINTER.

FIRST INTRODUCED BY

SHARP & HITCHMOUGH,


WHO ARE THE ONLY MAKERS.

“Aptus” Combination Lantern Screen and Background.

ABSOLUTELY OPAQUE.

TTT

PLEASE EXAMINE THE SAMPLE. Mounted on Moulded Battens and Split Rollers, Varnished, in one piece without seam.

<p>SCREENS ONLY.</p> <p>4 × 4 Feet. 11/-</p> <p>5 × 5 Feet. 13/-</p> <p>6 × 6 Feet. 15/6</p>		<p>SCREENS ONLY.</p> <p>7 × 7 Feet. 18/6</p> <p>8 × 8 Feet. 22/-</p> <p>Cords and Pulleys 2/- extra.</p>
---	--	---

8 × 8 feet is the largest size screen we can offer in this make.

Portable Elevators, as wood-cut, for above Screens, **7/6**, 7 ft. ; **8/6**, 8 ft.
 Portable „ „ „ for Soft Calico Sheets, „ „ „

Model Elevator and Screen, post free **2/-**, for Counter use.

Special Matagraph Screen, 10 × 10 feet, all in one piece without seam,
 Mounted complete with cords and pulleys, **£3 3 0** TTT

Sharp & Hitchmough (Makers), Liverpool.

WRATTEN'S LONDON PLATES



*"The Best
Climate
Resistants."*

EVERY improvement that the careful conservation of added experience suggests is, after satisfactory trial, adopted, keeping our Works thoroughly up to modern requirements.

The London Plates enjoy an unequalled reputation for ease of working and reliability under all climatic conditions.

Wratten & Wainwright,
Croydon.

Telegrams :
"Wratten, Croydon."

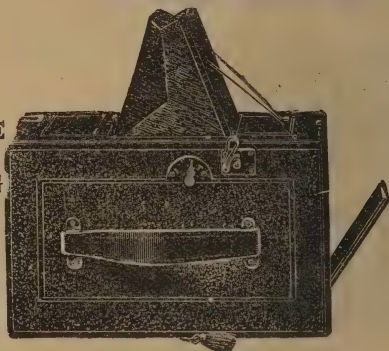
LISTS FREE.

See also tops of Diary, starting page 584.

See also page 338.

THE MIRAL REFLEX HAND CAMERA.

FULL-SIZE
FOCUSSING
FINDER.



Dimensions,
fitted with
5-inch Lens,
 $8\frac{1}{2} \times 5 \times 5$
inches.

THE STANDARD MIRAL.

THIS is the most compact and reliable camera ever made. It has a Time and Instantaneous Shutter, with engraved speeds, from $1/15$ to $1/100$ of a second; a Magazine, holding 12 plates, with counting indicator, registering the number of plates exposed; rack and pinion focussing arrangement, enabling objects to be taken at any distance from infinity down to six feet; engraved focussing scale; two tripod bushes. We give below a list of suitable Lenses, but we make a speciality of fitting customer's own lenses to this pattern "Miral." We can fit lenses to the $\frac{1}{4}$ -plate camera having focal lengths of from $4\frac{1}{4}$ to $5\frac{3}{4}$ inches measured from the back combination.

SEND FOR ILLUSTRATED CATALOGUE.

PRICES:—

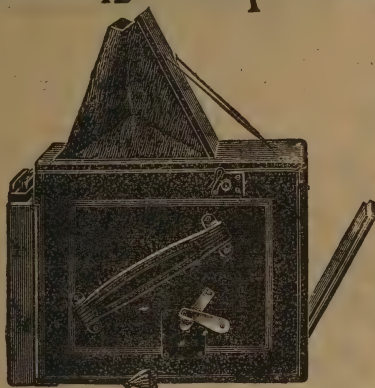
Quarter-Plate, to take purchaser's own or any lens, including engraving focussing scale	£3 3 0
Fitted with Richmond R.R. lens	4 4 0
Fitted with Miral lens (made specially for us by Messrs. Taylor, Taylor, & Hobson, Ltd.)	5 19 0
Fitted with Taylor, Taylor, & Hobson's Cooke lens, Series III., 5-inch focus	7 7 0
5×4 , to take purchaser's own lens	5 5 0
Leather Carrying Case with Sling Strap	0 17 6
Rising Front, $\frac{1}{4}$ -plate size, extra	1 1 0

TALBOT & EAMER, 54, SEEL STREET, LIVERPOOL.

The Reversing Back MIRAL.

B MODEL.

**SHUTTER
SPEEDS
FROM
1/15 to 1/100
OF A
SECOND.**



**FULL-SIZE
FINDER
AND
RISING
FRONT, IN
USE BOTH
WAYS.**

The Finest Camera on Earth.

FULL SIZE FINDER.—The introduction of this feature in a hand camera simplifies the operation of taking a photograph in a greater degree than any previous invention or improvement. In the above model of the Miral the image is formed by the lens which takes the photograph upon a gray glass screen conveniently placed on the top of the camera. All objects are seen actual size, and an absolutely accurate picture, both vertically and horizontally, can be composed up to the instant the shutter is released.

FOCUSING.—By means of a milled head, easily grasped, the picture may be focussed on the finder as critically as in a stand camera. The attention of the operator is not diverted an instant from the arrangement and focussing of his picture, and if care is taken in these operations the result is certain. The hood of the finder is so shaped that extraneous light cannot enter, and the gray glass is the finest procurable; the mirror is patent plate silvered, not sheet glass, and the greatest attention is paid to the accurate adjustment of all parts by skilled workmen.

RISING FRONT.—This movement is effected by a conveniently-placed milled head, and the exact amount of rise is shown on the finder. An inch of rising front is given, which means that the operator may choose his $3\frac{1}{2} \times 4\frac{1}{2}$ picture within a range of $5\frac{1}{2} \times 4\frac{1}{2}$ inches. The tops of high buildings or trees may be included where, without the movement, they would be left out; unsightly foregrounds may be cut off altogether, and the sky line lowered on the plate.

SHUTTER.—Behind lens self-capping with speed from $1/15$ to $1/100$ of a second. Time or instantaneous exposures may be given.

LENS.—We list a few suitable lenses, but any maker's 6-inch lens can be fitted or any lens having a focus of not less than 5 inches measured from the flange. When Reversing Magazine is fitted a somewhat longer lens is required.

SEND FOR ILLUSTRATED PRICE LIST.

PRICES:—

Quarter-plate, without lens, including fitting own or any lens, and three special double-dark slides	£4 15 0
Fitted with Busch Detective Aplanat $f/6$ No. 2½A	6 10 0
” Cooke Lens, Series III. $f/6.5$, 6-inch focus	9 7 0
” Ross Symmetric Anastigmat, 6-inch focus	9 5 0
Quarter-plate, with Reversing Magazine in place of dark slides, including fitting purchaser's own or any lens	6 2 0
5×4 fitted to any 6½ inch or longer lens	6 15 0
¾-plate fitted to 8½ inch or longer lens	9 9 0
Extra Dark Slides, ¾-plate	0 6 0
” ” 5×4	0 8 0

TALBOT & EAMER, 54, SEEL STREET, LIVERPOOL.

Brands —

"Castle" Ordinary

"Electric" Extra Rapid

"Mawson" Instantaneous

"Lantern" Transparencies

"Half - Tone"

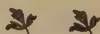
"Photo
Mech."

"Ortho."

MAWSON'S

Dry Plates

Are
Always
Uniformly
Excellent in
Quality & Speed.



Mawson & Swan,

**Newcastle-on-Tyne,
ENGLAND.**



MAWSON'S

"CASTLE"

PLATES

STILL UPHOLD THEIR
SPLENDID REPUTATION
AS THE MOST
Uniformly Excellent Plates.

TRADE MARK



THE CASTLE.

Sufficiently Rapid for Instantaneous
Work.

Keep Well.

Allow Great Latitude in Exposure.

Develop and Fix Easily and Cleanly.

Write for Pamphlet and Pocket Note Book.

MAWSON & SWAN,

11-15, Mosley Street, Newcastle-on-Tyne;
33, Soho Square, London.

Mawson's "Electric" Plates

ARE

THE Plates "par excellence" for
Studio work,

and are in daily use in the principal Studios
throughout Great Britain and the Continent.

AMATEURS will find them the best for
Hand Camera work, coated on selected
Thin Glass and of the very highest
quality.

Mawson & Swan,

11-15, Mosley Street, NEWCASTLE-ON-TYNE.
33, Soho Square, LONDON, W.



MAWSON'S

"Lantern" Plates

Give

BLACK

BLUE BLACK

BLUE

RED

TONES.

GOLD and SILVER MEDALS

DIPLOMAS and PRIZES.

Taken at all the Principal Competitions.

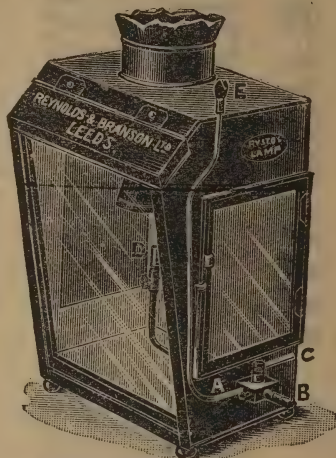
HUNDREDS

Of Testimonials from all parts of the World. Insist upon having MAWSON'S make and take no other.

REYNOLDS & BRANSON, Ltd.

THE RYSTOS DARK ROOM LAMPS.

By turning a handle, non-actinic Ruby may be exchanged for white light, or both turned down to non-luminosity.



PRICES (FOR GAS).

No. 1 Lamp,	11½ by 7½ ...	15/-
No. 2 "	12½ by 8½ ...	20/-
No. 3 "	Vertical Front, 8½ by 5½	10/6

Safe Lights for Spectrum Plates from 4/- extra.

New Designs for Electricity and Acetylene, from 17/6.

RYSTOS PORTABLE DEVELOPERS:

In Glass Tubes ready for dissolving in water.

Hydrokinone, Metol-Pyro, Metol-Quinol.

Pint size, 8d. ; Quart size, 1/-

The above developers have been most carefully compounded, and will be found convenient, and to give excellent results.

The Metol-Quinol, specially diluted, is suitable for developing positive prints.

New Catalogue of Photo Requisites, 24th Edition, 96 Pages, on application.

14 Commercial Street, LEEDS.

MAWSON'S "LANTERN" PLATES.



*The Editor of "St. Veronica," India, says,
March, 1902:—*

"My opinion of these plates was given some thirteen years ago, and I have not had occasion to modify my opinion that the peculiarity of Mawson's Lantern Plates is the impossibility of bad work with them. **Any novice can with them produce positives of the highest technical excellence.**"



The MAWSON "LANTERN" PLATES are manufactured
solely by

MAWSON & SWAN,

33, SOHO SQUARE, LONDON;
MOSLEY STREET, NEWCASTLE-ON-TYNE.

ATKINSON BROS.

(Late JOHN J. ATKINSON),

SEND FOR ESTIMATES.



95 & 95a, Whitechapel, and
66, Victoria Street,



Telegrams: "Perfection."
Telephone No. 5143, Central.

LIVERPOOL.

MAWSON'S *Orthochromatic* *Plates.*

A. Mawson's Orthochromatised Plates. A. Specially suitable for landscape work, also for photographing fruit and flowers and the copying of pictures, etc., in those instances where the red is not pronounced.

B. Mawson's Orthochromatised Plates. B. Specially made for work in which the red is pronounced.

The A. Brand is a very rapid plate.

Either brand can be used for ordinary work without a screen when desired.

The Editor of "PHOTOGRAM" says:—

"Orthochromatic Photography for Amateurs"

is the title of some really useful notes by Mr. Arthur Payne, F.C.S., and published by Mawson & Swan, Mosley Street, Newcastle-on-Tyne, which will be sent post free on application.

HAND CAMERA WORK.

MAWSON'S

"CASTLE."

"ELECTRIC."

"MAWSON."

**Coated on Selected
Thin Glass.**

$3\frac{1}{2}$ by $2\frac{1}{2}$ $4\frac{1}{4}$ by $3\frac{1}{4}$ and 5 by 4



To be had through Dealers, or

MAWSON & SWAN,

33, SOHO SQUARE, LONDON;
MOSLEY STREET, NEWCASTLE-ON-TYNE.

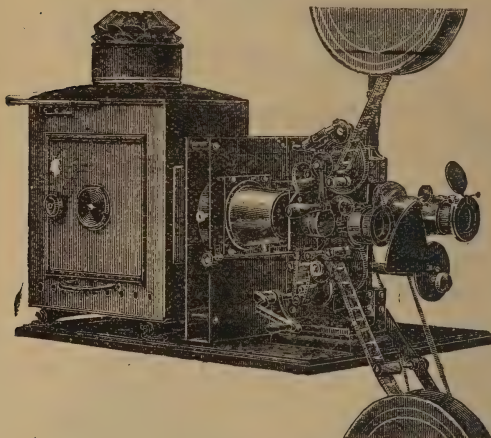
Animated Photography.

“PRESTWICH”

Cameras, Projectors, Printers, Perforators, and every requisite for this branch of Photography,

Obtained the only two Awards.

Hold the highest reputation for **Excellency, Efficiency, and Simplicity.**



No. 7. PROJECTOR WITH SLIDING LANTERN.

Our No. 7 Projector has gained such favour in the trade that we were unable to meet the demand last season. We have now doubled our output. Letters of praise constantly being received.


Illustrated Catalogue Free.

- No complicated parts.
- Easy to manipulate.
- Only 16 per cent. of light cut off.
- No flicker.
- Adjustment of 1 inch.
- Picture, light, and lens always in true optic centre.
- Picture always in same position on screen.
- Perfectly steady.
- Cannot tear or scratch film.
- Guaranteed to be the best.
- Of finest construction and finish, and very compact.

THE PRESTWICH MANUFACTURING CO.

1, Lansdowne Road, Tottenham, London, N.

MAWSON'S FILMS



ON CELLULOID.

FLAT

STIFF

For Hand Cameras

For Stand Cameras

TWO SPEEDS

ONE PRICE

Some Films "curl" — but **Mawson's**
don't. Being coated on *thick* Cellu-
loid, they are perfectly **flat** and **stiff.**



NUMEROUS TESTIMONIALS.

Pamphlets and Price List on Application.



Mawson & Swan,

33, Soho Square, London;

Mosley Street, Newcastle-on-Tyne.

THE
Edinburgh Photographic Warehouse



FOR ALL
HIGH-CLASS CAMERAS, LENSES,
and ACCESSORIES,
HIGH-CLASS LANTERN EXHIBITIONS,
AND
ROYAL CINEMATOGRAPH ENTERTAINMENTS.

TWO ROYAL COMMANDS WITHIN A YEAR.

FRASER & ELRICK

Had the unique honour of giving the first Entertainment of the Reign at Balmoral Castle on 14th October last, and have now on the 13th September, within a year, had the distinguished honour, for the first time in history, of exhibiting to a King and his Court a complete Cinematograph record of the processions and incidents attending his own Coronation.

Exhibitions of the Royal Programme to be had for Town or Country.

TERMS MODERATE.

Lantern Slides made. Lectures Illustrated.

Cameras and Optical Apparatus
of every description.

Photographic Developing, Printing & Enlarging,
At our own Studios.



FRASER & ELRICK,

Opticians and Photographic Dealers,

57, HANOVER STREET, EDINBURGH.

Telegrams: "PHOTOGRAPH, EDINBURGH,"

Telephone: 2 Y.

Mawson's

DRY
PLATES
are
regularly
used
by
Professionals
and
Amateurs

IN

China
India
Straits
Settlements
Australia
New Zealand
Africa
Egypt
European
Countries
Great Britain
Ireland

Manufactured Solely by

Mawson & Swan,

Mosley St., Newcastle-on-Tyne.

Third Edition. Crown 8vo, cloth, with Illustrations, price **1s.** Postage 2d.

THE LIGHTING IN PHOTOGRAPHIC STUDIOS. By P. C. DUCHOCHOIS. Revised and Enlarged by W. E. HENRY, C.E.

Second Edition. Crown 8vo, cloth, price **5s.** Postage 4d.

PHOTO-MECHANICAL PROCESSES. A Practical Guide to Photo-Zincography, Photo-Lithography, and Collotype. By W. T. WILKINSON.

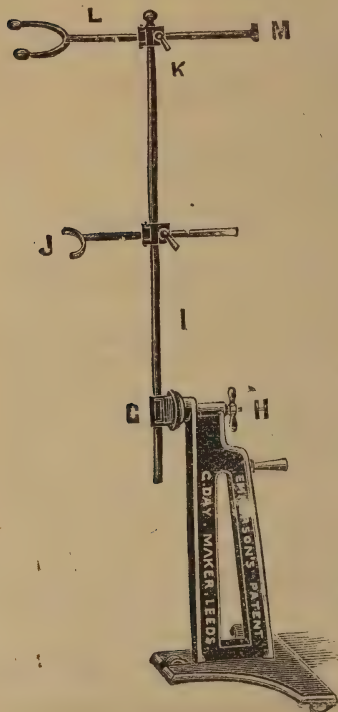
Second Edition. Crown 8vo, cloth, price **2s. 6d.** Postage 2½d.

PHOTOGRAPHIC REPRODUCTION PROCESSES. A Practical Treatise of the Photo Impressions without Silver Salts. By P. C. DUCHOCHOIS, Author of "Lighting in Photographic Studios." Edited, with additional matter, by E. J. WALL, Author of the "Dictionary of Photography."

Third Edition. Demy 8vo, cloth, with Illustrations, price **2s. 6d.** Postage 4½d.

THE OPTICAL LANTERN, for Instruction and Amusement. By ANDREW PRINGLE, F.R.M.S.

The above books may be obtained from most photographic dealers, or can be had direct from the Publishers,—**HAMPTON & CO., 12 & 13, Cursitor St., London, E.C.**



EMMERSON'S Patent Standard

AND

Carriage Head Rest.

The Emmerson Rest,

while combining all the advantages of the rests that are in the market, is so universal in its movements as to give the operator more facility in meeting the requirements of his clients. It is worked entirely by three screws, and these are arranged to give the result required with the slightest touch. It is made in the best malleable iron and brass, and in finish and style of workmanship can be surpassed by none.

PRICES.

With carriage	...	...	£4 0 0
Without carriage, but wheel in front	...	...	2 5 0
Child's best quality	...	...	2 0 0

COMMON.

With brass fittings and wheel in front	...	...	1 10 0
With iron fittings	...	...	1 6 0
Child's best quality	...	...	1 4 0

GEORGE DAY,
Sole Maker & Proprietor,
Edward St., Lady Lane,
LEEDS.

Payne's
Exposure
Calculator
FOR
Mawson's
Dry
Plates.

As
Easy As
A · B · C
Simplicity
Itself.

Sent free by post, together with
a copy of Mawson's Exposure Note Book

FOR SIXPENCE.

MAWSON & SWAN,

33, Soho Square, London ;
Mosley Street, Newcastle-on-Tyne.

HOLMES BROS.
Wholesale Manufacturers of
Photographic Apparatus.
TO TRADE ONLY.

Established 1884.

Telephone 487, K.C.

Steam Works: 3, Park Works, Park Street, Islington, N.

THE "SCROLL"
Patent Roller Blind Shutters.
Simple, Reliable and the most Compact. Time and Instantaneous.

Made in polished Mahogany, fitted with Speed Indicators and Pneumatic Release, and can be had either before or behind lens pattern at one price, the latter having detachable panels and fixing screws complete.

They comprise the following forms :—Single Blind from 10/6; Stereoscopic Blind from 17/6; Double Blind centrally opening and Double Blind Foreground from 15/-; Self-Capping Shutters from 15/-; Silent Shutters from 15/-; Focal Plane from 18/-.

Full particulars and prices on application to Patentee and Sole Maker—

B. W. HORTON, Cold Harbour, Hythe, Kent.

COLLOTYPE

SUPERIOR WORK. CHEAP RATES.
QUICK DELIVERY.

Photographers' Illustrated Price Lists, Picture Post Cards, Christmas Cards, View Books, Catalogues, and all styles of high-class reproductions.

➤ **COE** ◀

Collotype Printing Co.,
44, VICAR LANE, BRADFORD.

X RAYS

THE PLATES AND FILMS

SPECIALLY SUITED

FOR

X RAY PHOTOGRAPHY

ARE

MAWSON'S

“Castle”

Plates and Films.



Recommended and used by the Leading Specialists. Vide testimonials from John Hall Edwards, Esq., L.R.C.P., F.R.P.S., and numerous others.



MAWSON & SWAN,

11-15, MOSLEY STREET, NEWCASTLE-ON-TYNE;

33, SOHO SQUARE, LONDON.

WONDERFUL VALUE IN **HAND and STAND - - CAMERAS.**

WE guarantee that equal value to the Cameras mentioned below has never been offered, and, as proof of this, are prepared to send on approval to any part of the United Kingdom.



THE SERVICE No. 0 is fitted with superior achromatic lens and time and instantaneous shutter, with adjustable speeds, two best quality brilliant finders, a new absolutely infallible changing mechanism. It takes 12 plates or 24 cut films, and a recorder showing number exposed. It is a beautifully finished instrument, and is covered in morocco-grained leatherette. Screw and bushes for fixing Camera to tripod are supplied.

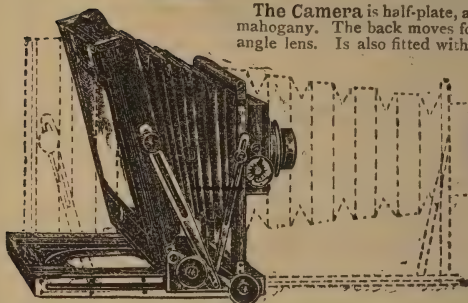
Price, complete, with book of instructions, 18/6

The No. 1 as above, but fitted with three magnifiers for objects at 4, 8, and 12 feet.

Price, complete, 22/6.

The No. 2 is fitted with a very superior rapid rectilinear lens with iris diaphragm, and focussing jacket for objects as near as 6 feet. The shutter is an improved time and instantaneous, with adjustable speeds.

Price, complete, 35/-.



The Camera is half-plate, and is made of finest Spanish mahogany. The back moves forward to allow use of wide-angle lens. Is also fitted with reversing and swing back, and new swing front as illustrated.

The Lens is a specially selected R.R., working at $f/8$, and is fitted with iris diaphragm.

The Shutter is a Thornton-Pickard pattern T. and L., and is fitted with speed indicator working behind lens.

Price, complete, with special slide and three-fold tripod, 59/6.

The above Camera can be supplied fitted with one of the famous Busch Rapid Aplanat Lens No. 2, working at $f/8$. The Camera has sufficient extension to enable the use of the back combination of the lens alone to be used, thus being extremely useful for landscape and telephoto effects. And a genuine Thornton-Pickard time and instantaneous shutter, with speed indicator working behind lens.

Price £4 4s. With T. T. & H. Lens, £5 5s.

THE SERVICE PHOTOGRAPHIC SOCIETY,
292, HIGH HOLBORN, LONDON, W.C.

Every make and description of camera, lens, &c., supplied on advantageous terms. Complete lists sent free. Old cameras taken in part payment. Monthly payments taken.

New and
Up-to-Date Developer



Mawson's
Metol and
Hydroquinone

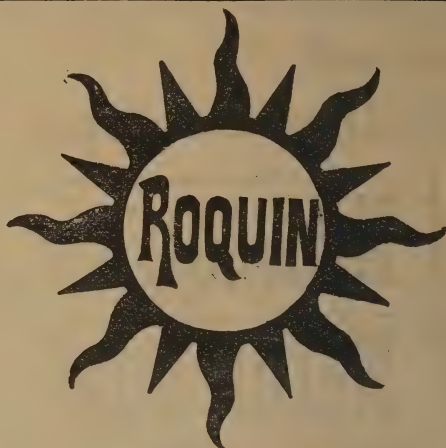
A concentrated
One Solution Developer,
for Plates, Films,
Lantern Slides,
Bromide Paper, Velox, &c.

Per **1/3** Bottle.

Manufactured by

MAWSON & SWAN,

33, Soho Square, LONDON;
Mosley Street, NEWCASTLE-ON-TYNE.



W. H. YOUNDALE, Esq., F.R.M.S., F.E.S., says:—

"I have used many developers, but consider 'Roquin' to be the best in the market. Its results are certain, the negatives made with it have good printing qualities, and I have never failed to get a good picture with it."

ONE SOLUTION DEVELOPER.

Specially suited for Amateurs.

Supplied ready for use.

Keeps well, and is Economical.

Excellent for

**NEGATIVES AND
BROMIDE PAPER.**



Sold in Bottles at 1/- (about 16 oz.), and 2/- (40 oz.) each.

DOES NOT STAIN THE FINGERS.

Roquin is manufactured solely by

MAWSON & SWAN,
NEWCASTLE-ON-TYNE AND LONDON.

Mawson's

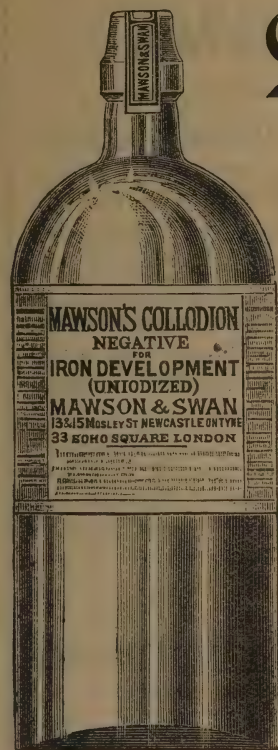
Collodion

is used by the
PRINCIPAL

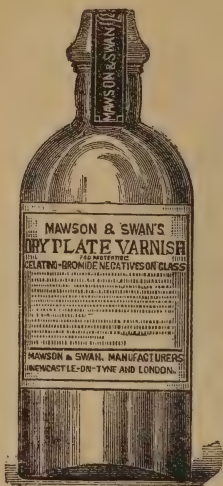
Process

Workers

throughout ENGLAND
and the COLONIES.



Mawson & Swan { 11-15, Mosley Street,
Newcastle-on-Tyne.
33, Soho Square, London.



**MAWSON'S
PHOTOGRAPHIC
VARNISHES.**

PREPARED specially for Photographic work with the very best quality of gums, and regularly used by a considerable number of the leading members of the Profession.

The difference in cost between the price of a cheap and common article, and that of the best quality, is so extremely small on the life of a valuable negative, that it should be ignored altogether.

If varnishing is worth doing at all, it is worth doing well, and abundant evidence has been given to prove that the varnishing of negatives, and especially gelatine negatives, is a matter of absolute necessity.

- USE -

MAWSON'S Standard DRY PLATE Varnish.

2 gallon Winch. Pints. ½ Pints.
Tins. quarts.
30/- 9/- 2/6 1/4 and 1/- and 6d. Bottles.

ANILINE COLOURS

Put up in small quantities, in corked phials,
for the convenience of Photographers.

PRICE LISTS ON APPLICATION.

SUPPLIED BY

MAWSON & SWAN.

MOSLEY ST., NEWCASTLE-ON-TYNE.



A quick-drying

Backing

Composition

For Dry Plates,
to prevent halation.

It dries hard in a few minutes, is
opaque, and is easily removed with a
damp sponge.

In Bottles, 9d. each.

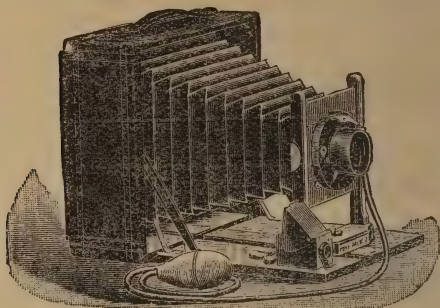
By Post, 1/3.



See Testimonials.

ROCHESTER OPTICAL & CAMERA CO.

PONY PREMO No. 2.

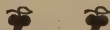


This Camera has
Reversing Back, and is
fitted with B. and L.
Gem Shutter and
R.R. Lens.

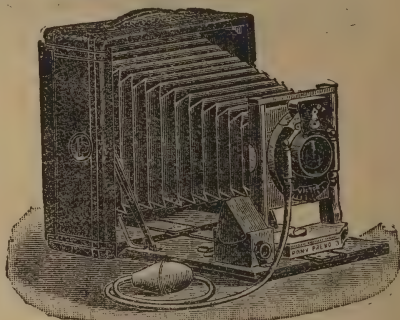


Camera, complete in case with one Holder	...	...	...	...	4x5	£2 2 0
Premo Double Plate Holders	...	...	...	...	"	0 4 0
Pony Premo No. 2A, similar to above, but fitted with Rack & Pinion	...	...	...	...	"	3 0 0

PONY PREMO No. 3.



This Camera has
Reversing Back, also
Swing Back, and is fitted
with Victor Shutter and
R.R. Lens.



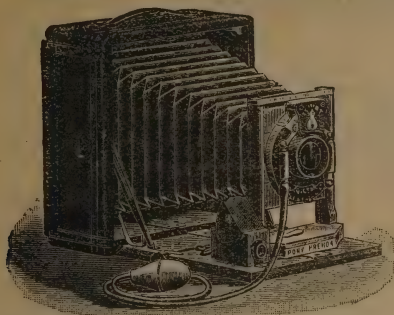
Camera, complete in case, with three Holders	...	...	...	...	4 x 5	£3 15 0
Premo Double Plate Holder	...	...	...	...	"	0 4 0
Pony Premo No. 3a, ditto, but with Rack and Pinion and one Holder	...	...	...	...	"	3 15 0

THE ROCHESTER OPTICAL AND CAMERA CO.

112-113, Fore Street, London, E.C.

Telegrams—"Optelling."
Telephone—4677 Central

WRITE FOR LIST G.

PONY PREMO No. 4.

❖ ❖

This Camera has
Reversing Back, Swing
Back, and Rack and
Pinion, fitted with Victor
Shutter and
Symmetrical Lens.

❖ ❖

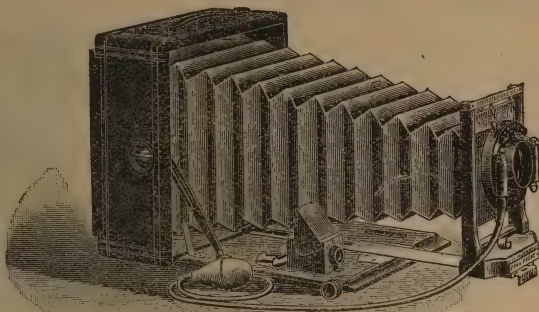
Camera, complete in case, with one Holder 4×5	£4 4 0	$\frac{1}{2}$ -plate (5×7)	£5 10 0
Wide-angle Lens, extra...	1 10 0	" "	1 15 0
Premo Double Holders...	0 4 0	" "	0 5 0

PONY PREMO No. 5.

❖

This
Camera has
Rack and
Pinion,
Reversing
and Swing
Back, and
is fitted
with Auto
Shutter and
Symmetri-
cal Lens.

❖



	4×5 .	$\frac{1}{2}$ -plate (5×7)
Camera, complete in case, with one Plate Holder	£6 0 0	£7 10 0
Wide-angle Lens ...	1 10 0	1 15 0
Premo Double Holders ...	0 4 0	0 5 0
Pony Premo No. 5a, same, but with Victor Shutter	5 5 0	6 10 0

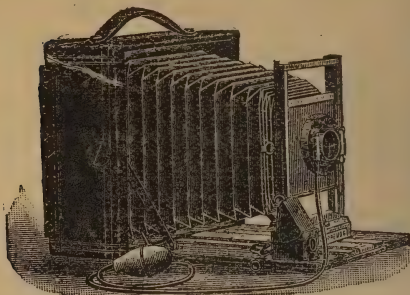
THE ROCHESTER OPTICAL AND CAMERA CO.

112-113, Fore Street, London, E.C.

Telegrams—"Optelling."
Telephone—4677 Central.

WRITE FOR LIST G.

PONY PREMO No. 6.



This Camera stands pre-eminent, and is the most complete and popular of all Hand Cameras. It has Reversing Back, Swing Back, fitted with the new Auto Shutter on purely automatic principles; the Camera is fitted with Symmetrical Lenses of high grade quality. Also Lenses of other manufacture can be fitted to this Camera.

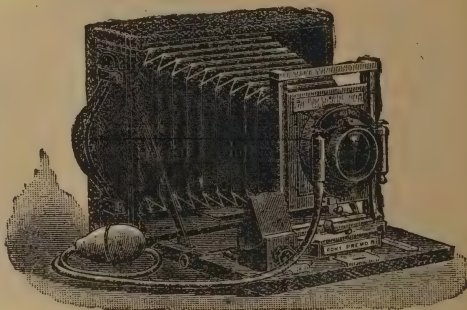
Camera, complete in case, with one Plate

Holder	...	...	...	...	4 × 5	£8 0 0	1/2-plate or 5 × 7	£10 0 0	
Wide-angle Lens, extra	...	...	...	...	"	1 10 0	"	"	1 15 0
Premo Plate Holders	...	...	...	...	"	0 4 0	"	"	0 5 0

PONY PREMO B.

This Camera is very compact in form. Smaller than the Reversible Back of the other Pony series. Is fitted with Rack and Pinion.

This Camera is supplied in the 1/4 plate and 5 × 4 and 1/2-plate.



The Quarter-Plate Camera is supplied with a Roll Holder at £3 15s.

Camera, complete in case, with one Holder	...	1/4-plate.	5 × 4.	1/2-plate.
Premo Plate Holder	...	£3 15 0	£3 7 6	£4 7 6
Shoulder Strap, extra	...	0 4 0	0 4 0	0 5 0
	...	...	1s. each.	

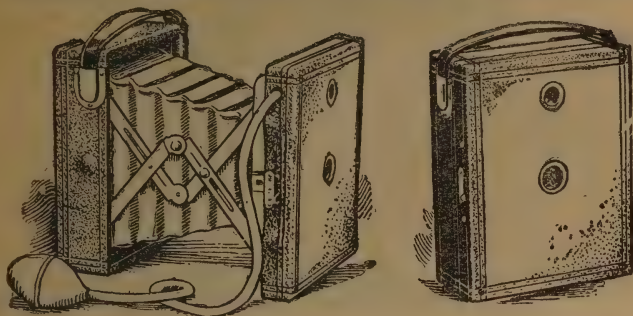
THE ROCHESTER OPTICAL AND CAMERA CO.

112-113, Fore Street, London, E.C.

Telegrams—"Optelling,"
Telephone—4677 Central.

WRITE FOR LIST G.

NEW FOLDING POCKET CAMERA.



With Pneumatic and Hand Release. Particulars, New Price List. A very neat and well-finished Camera. Suited for Presents. General Portraiture and Landscape Work. Is fitted with our Quick Single Achromatic Lens for $\frac{1}{4}$ -plates and complete for one Metal Dark Slide.

POCKET PONY QUARTER-PLATE HAND CAMERA.

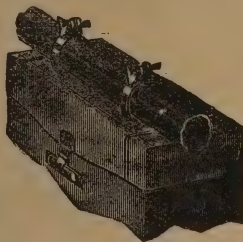
CYCLE CLAMP.



For using Camera on Handle-bars of Bicycle. Can be used in any position.

Price complete ... 3/-

CYCLE CARRIER.



This little device enables the user to suspend the case on the top bar of the diamond frame. Does not hinder the removal of Camera.

Price per pair ... 3/-

THE ROCHESTER OPTICAL AND CAMERA CO.

112-113, Fore Street, London, E.C.

Telegrams—"Optelling."
Telephone—4677 Central.

WRITE FOR LIST G.



A New, Cheap, and Attractive Series of

SLIP-IN ALBUMS

**Leaves of assorted Neutral Tones, bound in Art Cloth,
with Border and Lettering in White Foil.**

[illegible]

Camera Studies.

No.	Holding	24	Folding Pocket Kodak	Retail
S908	"	24	Bull's Eye	1/-
S909	"	24	Quarter-plate	1/-
S910	"	24	Five by Four	1/5
S911	"	24	Half-plate	1/9

.....

WILLIAM JOHNSON & SONS,

Makers of all kinds of Albums for the Photographic Trade.

18, UNION STREET, SOUTHWARK, LONDON, S.E.

▲ fully Illustrated (Retail) CATALOGUE will be sent to any Dealer on receipt of Trade Card.

TRADE



MARK.

AUTOTYPE.

PRICE LIST
 OF
TISSUE AND MATERIALS
 FOR THE
PERMANENT
AUTOTYPE (CARBON) PROCESS.

CONTENTS.

Autotype Tissues, Sensitive and
 Insensitive.
 Autotype Tissues in Cut Pieces.
 Photogravure Tissue.
 Single Transfer Papers (Smooth,
 Etching, Matt).
 Single Transfer Papers (Drawing,
 Gold and Silver, &c.)
 Sample Packets of Tissues and
 Transfers.

Autotype Tissue Chart.
 Temporary Support—Paper & Opal.
 Final Support.
 Sensitive Tissue Storage Boxes.
 A B C Guide—First Steps.
 Trial Sets of Materials—Amateur
 Printing Outfit.
 Complete Sets of Apparatus.
 Apparatus and Materials.
 Spotting Colours. Agents.

THE
AUTOTYPE COMPANY,
LONDON.

Offices and Fine Art Gallery:

74, NEW OXFORD STREET, W.C.

Works:

EALING DEAN, W.

Registered Cable and Telegraphic Address: "Autotype, London."

Revised December, 1902.

All Previous Lists Cancelled.

PRICE LIST

OF

MATERIALS AND APPARATUS

FOR THE

AUTOTYPE (CARBON) PROCESS.

AUTOTYPE TISSUES.

SENSITIVE. (READY FOR USE.)

COLOURS.		
100	Standard Brown	{ Per Band, 12 ft. long, 30 in. wide ... 7/6
104	Engraving Black	{ Per Half-Band, 6 ft. long, 30 in. wide ... 4/0
105	Sepia	{ Per Quarter-Band, 3 ft. long, 30 in. wide ... 2/6
106	Red Chalk	{ Per Band, 10 ft. long, 30 in. wide ... 9/6
		{ Per Half-Band, 5 ft. long, 30 in. wide ... 5/0
107	Transparency	{ Per Quarter-Band, 2½ ft. long, 30 in. wide ... 3/0

The above Tissues are manufactured twice weekly, on Monday and Thursday, in a sensitive state for our own use, and are sent out in perfect condition.

INSENSITIVE.

100	Standard Brown	...	...	...	...	...
101	Standard Purple	...	...	...	...	...
103	Warm Black	...	...	...	...	...
104	Engraving Black	...	...	...	...	...
102	Brown Black	...	...	...	...	...
105	Sepia (tint of a Sepia Drawing)	...	...	...	Per Band, 12 ft. long,	...
97	Warm Sepia	...	...	...	30 in. wide ...	6/6
111	Cool Sepia	...	...	...	Per Half-Band, 12 ft. long,	...
106	Red Chalk (tint of Red Chalk Drawing)	...	...	...	15 in. wide ...	3/6
93	Terra Cotta	...	...	...	Per Quarter-Band, 6 ft.	...
96	Chocolate Brown	...	...	...	long, 15 in. wide ...	2/0
150	Ruby Brown	...	...	...	...	...
152	Dark Blue	...	...	...	...	...
151	Sea Green	{ Moonlight and Marine effects				
165	Italian Green					
		{ Per Band, 10 ft. long, 30 in. wide ...	...	...	...	8/6
107	Transparency	{ Per Half-Band, 10 ft. long, 15 in. wide ...	...	...	...	4/6
		{ Per Quarter-Band, 5 ft. long, 15 in. wide ...	...	...	...	2/6
113	Rich Warm Brown, for Portraits	{ Per Band of 30 sq. ft. ...	...	...	...	7/0
		{ Per Half-Band of 15 sq. ft. ...	...	...	...	3/9
114	Rich Purple Tone ditto	{ Per Quarter Band of 7½ sq. ft. ...	...	...	...	2/0

THE AUTOTYPE COMPANY, LONDON & EALING DEAN.

AUTOTYPE TISSUES: CUT PIECES.**SENSITIVE AND INSENSITIVE.**

Supplied in dozens only of one colour up to and including half-plate size. In whole-plate size and upwards half-dozens may be had.

Sizes	$4\frac{1}{2} \times 3\frac{1}{2}$	5×4	$6\frac{1}{2} \times 4\frac{1}{2}$	7×5	$8\frac{1}{2} \times 6\frac{1}{2}$	10×8	12×10	15×12 in.
Per doz.....	5d.	7d.	10d.	1/0	1/6	2/0	3/0	4/0
	$3\frac{1}{2} \times 3\frac{1}{2}$							
	or							

TRANSPARENCY.

Sizes	$4\frac{1}{2} \times 3\frac{1}{2}$	4×4	5×4	$6\frac{1}{2} \times 4\frac{1}{2}$	$8\frac{1}{2} \times 6\frac{1}{2}$	10×8	12×10	15×12 in.
Per doz.....	7d.	8d.	11d.	1/3	2/0	3/0	4/0	5/6

Sensitive Tissue is supplied regularly in the following five colours :—

Standard Brown, Engraving Black, Red Chalk, Sepia and Transparency (brown).

Orders for certain other colours, such as Brown Black, Warm Sepia, Blue and Sea Green are accepted for execution when the Company is manufacturing such colours for its own use.

The Cut Pieces of Sensitive Tissue are carefully packed in waterproof papers, but it is recommended that on receipt the original wrappers should be entirely removed, and the Tissue placed in one of the Company's improved Storage Boxes (see page 5).

In the Company's experiments Sensitive Tissue kept in one of these boxes remained in good working order for three months, the usual period when stored without special protection being two to three weeks.

PHOTOGRAVURE TISSUE.

1. Red Chalk. 2. Special Brown. 3. Burnt Sienna.

Price per Band, 12 ft. long, 30 in. wide, 15/0.

Half-Bands, 8/0. Quarter-Bands, 4/6.

One quarter of a Band is the least quantity supplied. The Chemical composition of all three is alike, the difference in colour is principally a question of convenience in watching the progress of etching.

SINGLE TRANSFER PAPER.

This is a fine paper coated with insoluble gelatine, forming the support of Autotype Prints from reversed negatives, or for prints where inversion of the image is of no consequence.

116	Single Transfer Paper, thick for large work, per Band, 12 ft. \times 30 in.	3/0
108	" " " medium thickness, " "	2/9
79	" " " fine thin, for small work, " "	3/6

CUT PIECES—SINGLE TRANSFER, MEDIUM THICKNESS.

Sizes	5×4	7×5	9×7	11×9	$12\frac{1}{2} \times 10\frac{1}{2}$	$15\frac{1}{2} \times 12\frac{1}{2}$
Per doz.	2d.	4d.	8d.	1/0	1/6	2/0

ETCHING PAPER—SINGLE TRANSFER.

The Company supplies a rough-surfaced toned Etching Paper for SINGLE TRANSFER. This paper yields prints with broad artistic effect, and free from the glaze of an ordinary carbon print. By masking the negative, prints may be developed on this paper with suitable margin, rendering mounting unnecessary.

Sizes	5×4	7×5	9×7	11×9	$12\frac{1}{2} \times 10\frac{1}{2}$	$15\frac{1}{2} \times 12\frac{1}{2}$
Price per doz. ...	3d.	5d.	10d.	1/4	2/0	2/8

Also supplied in Sheets 36×22 in., at 9d. per sheet ;
and in Bands 12 ft. \times 30 in., price 3/9.

THE AUTOTYPE COMPANY, LONDON & EALING DEAN.

MATT SURFACE SINGLE TRANSFER.

(WHITE OR TONED.)

A paper with very fine grain—as used by the Company for “Auto-Crayon” Enlargements. An excellent surface for working on in pencil or crayons.

Sizes	5×4	7×5	9×7	11×9	12½×10½	15½×12½
Price per doz. ...	3d.	5d.	10d.	1/4	2/0	2/8

Per Band of 30 sq. ft., 3/9.

DRAWING PAPER—SINGLE TRANSFER.

White in Fine, Medium and Rough }
Grains, and Rough Toned, } in **sheets only**, 30×22 in., 1/0 each.

MATT AND ROUGH SURFACE SINGLE TRANSFER PAPERS.

In various Art Shades ... 9d. per sheet.

GOLD AND SILVER SINGLE TRANSFER PAPERS.

The Gold Paper will be found extremely suitable for sunset effects, and the Silver Paper for moonlight and snow pictures, &c., &c.

Silver Paper	30×22	} 1/0 per sheet.
Gold "	25×20	

SAMPLE PACKETS OF TISSUES AND TRANSFER PAPERS.

The Autotype Company supply sample packets in three sizes, containing as follows :
Insensitive Tissues in 12 varieties, viz. :—

Standard Brown.	Red Chalk.	Warm Sepia.	Dark Blue.
Engraving Black.	Portrait Brown.	Terra Cotta.	Italian Green.
Sepia.	Brown Black.	Sea Green.	Special Transparency.
3 pieces Smooth Single Transfer Paper.			
3 " Matt " "			
3 " Etching " "			
3 pieces Final Support.			
2 " Temporary Support.			

Prices, post-free.

½-plate.	Whole-plate.	12×10.
2/0	3/0	5/0

AUTOTYPE TISSUE CHART.

The Complete Tissue Chart. The Sixteen Stock Colour Varieties of Tissue manufactured by The Autotype Company, illustrated by charming Portraits of Children, from negatives kindly lent by Messrs. W. J. Byrne & Co., Richmond, S.W. Price 1/0. Post free 1/2.

THE AUTOTYPE COMPANY. LONDON & EALING DEAN.

SAWYER'S TEMPORARY SUPPORT. T.S. 112.

A specially prepared paper coated with insoluble gelatine, and solutions of certain lacs; prints can be developed upon it with the same ease and facility as on the Single Transfer Paper; when finished and placed in contact with the surface of the Autotype Final Support, the prints adhere firmly to it, and the Temporary Support imparts a gloss similar to Albumen Paper.

The Temporary Support may be used an indefinite number of times, only requiring to be rubbed over with the waxing solution to ensure the stripping of the print from its surface.

CUT PIECES.

Sizes..... 5×4 $7\frac{1}{2} \times 5\frac{1}{2}$ $9\frac{1}{2} \times 7\frac{1}{2}$ 11×9 13×11 16×13 20×17 23×18 in.

Per doz.. 7d. 1/0 1/8 2/4 3/3 4/6 7/6 9/0

Larger sizes up to 48 in. \times 36 in. at 3d. per square foot.

OPAL AS A TEMPORARY SUPPORT IN PIGMENT PRINTING.

Opal Plates, with a finely ground surface, supplied for the production of matt surface prints by double transfer. These take the waxing kindly without smear, hold well during development, and part readily when dry. The prints possess full detail in the shadows without any gloss. The material serves for an unlimited period.

Sizes 5×4 $7\frac{1}{2} \times 5\frac{1}{2}$ $9\frac{1}{2} \times 7\frac{1}{2}$ 11×9 13×11 16×13

Price per dozen..... 1/0 2/6 4/6 8/6 16/0 25/0

OPAL AS A FINAL SUPPORT FOR SINGLE TRANSFER PRINTS.

Sizes... $6\frac{1}{2} \times 4\frac{1}{2}$ $8\frac{1}{2} \times 6\frac{1}{2}$ 10×8 12×10 15×12

Price per dozen 1/6 3/6 6/0 9/6 16/6

FINAL SUPPORT FOR DOUBLE TRANSFER.

In two Shades—"Azure and Opal."

.86 Medium thickness, per Band, 12 feet \times 30 inches 3/0

.87 Fine thin, for small work, 12 " \times 24 " 3/6

CUT PIECES—OPAL SHADE, MEDIUM THICKNESS.

Sizes ... $4\frac{1}{2} \times 3\frac{1}{2}$ 7×5 9×7 11×9 $12\frac{1}{2} \times 10\frac{1}{2}$ $15\frac{1}{2} \times 12\frac{1}{2}$ 22×17 in.

Per dozen ... 3d. 5d. 9d. 1/2 1/9 2/6 3/6

AUTOTYPE SENSITIVE TISSUE STORAGE BOXES.

It has always been recognised that the Carbon Process was at a considerable disadvantage, as compared with other printing methods, owing to the limited keeping qualities of Sensitive Tissues. The insensitive material will remain in good condition for a year or more at least, but once sensitised it usually becomes insoluble and unworkable in two or three weeks. To overcome this difficulty the Company has conducted a series of experiments with a view to keeping Sensitive Tissue in a perfectly dry condition, whereby it was hoped the process of insolubility would be greatly retarded. The results have justified expectations, as it has been found that Sensitive Tissue properly protected will remain in workable condition for at least three months. The Company has decided to introduce a specially designed Storage Box, an improvement on the kind used in the

THE AUTOTYPE COMPANY, LONDON & EALING DEAN.

experiments, and it is believed Carbon workers will much appreciate the boon of being able to keep their Sensitive Tissue in good order for a considerably longer period than hitherto.

The boxes consist of a separate inner fitting provided with strong springs so that the cut pieces of tissue are kept quite flat, and a receptacle for a special desiccating compound. The whole is enclosed in a closely fitting japanned tin case, and a wide india-rubber band or waterproof plaster makes it practically air-tight.

Sizes	...	Half-plate and under.	Whole-plate.	12 X 10	15 X 12
Prices	...	5/0	6/0	8/6	10/6

THE A B C GUIDE TO AUTOTYPE PERMANENT PHOTOGRAPHY.

By J. R. SAWYER

Handsomely Bound in Cloth, Lettered and Gilt. With Two Illustrations. Price 2/6.

The Standard Handbook to the Process, replete with information practical and theoretical.

"FIRST STEPS IN AUTOTYPE PRINTING."

20 page pamphlet containing short practical instructions for single and double transfer printing, sensitising, &c. Post free, 3d.

TRIAL SETS OF CARBON PRINTING MATERIALS.

In order to combat the erroneous notion, somewhat prevalent amongst amateur photographers, that a trial of the Carbon Process necessarily entails the expenditure of a considerable sum on costly apparatus, the Autotype Company have decided to introduce cheap trial sets of the *absolutely essential* materials, particulars of which are appended.

In these cheaply priced outfits it is, of course, impossible to include developing, washing, or fixing tanks. For purely experimental purposes, however, some of the ordinary household crockery will serve as a makeshift, and the bath-room will be found a not altogether unsuitable apartment for carrying on operations.

Prices of Trial Sets.—Post free.

Whole-plate.	Half-plate or 5 X 4.	Quarter-plate.
4/6	3/6	2/6

Each Set contains — Sensitive tissue, single transfer paper, actinometer, squeegee, safe edge masks, powdered alum, and instructions for use.

THE AMATEUR'S AUTOTYPE PRINTING SET.

A complete equipment for AUTOTYPE SINGLE TRANSFER PRINTING, up to half-plate size, of which details are given below. The set contains everything necessary for an exhaustive trial of the process, and will, it is believed, supply the want of a complete outfit at a moderate price.

Printing Frame and Pad.

Disc Actinometer.

Sensitive Tissue (2 doz. $\frac{1}{2}$ -plate or 4 doz. $\frac{1}{4}$ -plate).

Single Transfer Paper (2 doz. $\frac{1}{2}$ -plate or 4 doz. $\frac{1}{4}$ -plate).

Slate Mounting Slab.

Squeegee.

Blotting Boards.

Two Cold Water Dishes.

One Developing Tank.

Enamelled Alum Dish.

Box of Powdered Alum.

Book of Instructions.

"First Steps in Autotype Printing."

The whole Packed in Box ready for rail. Price 15/0.

THE AUTOTYPE COMPANY, LONDON & EALING DEAN.

COMPLETE SETS OF APPARATUS FOR THE DEVELOPMENT OF CARBON PRINTS.

	No. 1. For pictures..... $4\frac{1}{2} \times 3\frac{1}{4}$ and under.	No. 2. $6\frac{1}{2} \times 4\frac{1}{2}$ and under.	No. 3. $8\frac{1}{2} \times 6\frac{1}{2}$ and under.	No. 4. 12×10 and under.
Stout Tin Mounting Tray	3/0	4/6	5/6	6/6
Stout Tin Developing Tank... ..	4/0	5/6	6/6	7/6
Three Nested Zinc Trays for cold water	10/6	18/0	24/0	27/0
Deep Porcelain Dish for Alum	2/3	3/0	4/3	5/3
One Autotype Sensitive Tissue Storage Box	5/0	5/0	6/0	8/6
Thermometer	2/0	3/0	3/6	3/6
Squeegee	1/6	2/0	2/6	3/0
Squeegee Board	2/0	3/0	4/0	5/6
Sawyer's Actinometer	5/0	5/0	5/0	5/0
American Clips	1/0	1/0	1/0	1/0
Bibulous Boards	1/0	1/0	1/0	1/0
Bottle Black Varnish... ..	6d.	6d.	6d.	6d.
Brush for ditto... ..	2d.	2d.	2d.	2d.
Oil Stove	4/0	4/0	4/0	4/0
Iron Legs for Developing Tank	2/6	2/6	2/6	2/6
A.B.C. Guide to Autotype	2/6	2/6	2/6	2/6
	2/6/11	3/0/8	3/12/11	4/3/5

SPECIAL APPARATUS AND MATERIALS.

	No. 1. 13×11 For pictures..... $4\frac{1}{2} \times 3\frac{1}{4}$ and under.	No. 2. 18×15 $6\frac{1}{2} \times 4\frac{1}{2}$ and under.	No. 3. 22×17 $8\frac{1}{2} \times 6\frac{1}{2}$ and under.	No. 4. 25×19 in. 12×10 and under.
Tin Mounting Trays	3/0	4/6	5/6	6/6
Developing Tanks	4/0	5/6	6/6	7/6
Zinc Cold Water Trays... ..	3/6	6/0	8/0	9/0
Johnson's Actinometer, with Sensitive Paper ... ..	...	...	...	2/6
Fraction Tint, ditto ditto ... ..	...	...	...	3/6
J. R. Sawyer's ditto ditto ... ..	...	...	...	5/0
H. J. Burton's ditto ditto ... ..	...	...	...	6/6
Sensitive Paper for Actinometer ... ..	...	...	per rouleau	6d.
Squeegees	8 in. 1/6; 12 in. 2/0; 15 in. 2/6; 18 in. 3/0			
Squeegee Boards ... ..	...	...	2/0, 3/0, 4/0, 5/6	
Indiarubber Cloth ... ..	...	...	per square foot	8d.
Thermometers ... ..	...	...	2/0, 3/0	3/6
Deep Porcelain Dishes for Alum ... ..	...	...	2/3, 3/0, 4/3	5/3

THE AUTOTYPE COMPANY, LONDON & EALING DEAN.

SPECIAL APPARATUS AND MATERIALS—continued.

American Clips	... ..	per dozen	1/0
Bibulous Boards	... ..	"	1/0
Waxing Compound, in cakes, for solution in Turpentine...	... ..	each	6d.
Waxing Solution, ready for use	... .. 5 oz. bottle	1/0, per pint	2/6
Black Varnish for edging Negatives	... ..	per bottle	6d.
Brush for ditto	... ..	...	2d.
Safe edge Masks for $\frac{1}{4}$, $\frac{1}{2}$, and whole-plate	... ..	per box	1/3
Orange Vignetting Paper	... ..	per quire	2/0
No. 1 Mineral Paper, 25 in. X 20 in., for front of Negatives	... ..	"	5/0
No. 2 " 40 in. X 30 in., for back of Negatives	... ..	"	10/6
Powdered French Chalk, for glass plates	... ..	per box	6d.
Cotton Flannel for applying French Chalk and Waxing Solution	... ..	per yard	6d.
Autotype Sensitising Compound	... ..	per tin	1/0
" " " " " " " " " " " "	... ..	per lb.	2/0
Oil Stove	... ..	...	4/0
Iron Legs for Developing Tanks	... ..	...	2/6

AUTOTYPE PERMANENT SPOTTING COLOURS.

The actual Pigments employed in the manufacture of Autotype Tissues, prepared as moist water colours. By the use of these Colours in spotting and finishing Autotype Prints, the tones of the copies can be accurately matched.

The Colours are :—Brown, Purple, Warm Black, Engraving Black, Red Chalk, Sepia, Warm Sepia, Cool Sepia, Dark Blue, Sea Green, Brown Black, Italian Green.

In Porcelain Pans, price 1/0 each.

*The Autotype Company's Tissues and Transfer Papers may
be obtained abroad of the following Wholesale Agents:—*

GUILLEMINOT BËSPFLUG & CIE., 6, Rue Choron, Paris.

ROMAIN TALBOT, 46, Kaiser Wilhelm Strasse, Berlin.

LAMPERTI & GARBAGNATI, Via Omenoni 4, Milan.

A. MOLL, 9, Stadt Tuchlauben, Vienna.

H. DE BONNIER & CIE., 14, Rue de la Blanchisserie, Brussels.

TH JOCHIM & CO., St. Petersburg and Moscow.

THE ANTHONY SCOVILL CO., 122-124, Fifth Avenue, New York, U.S.A.

BAKER & ROUSE, Melbourne and Sydney, Australia.

**The Company's Productions have been awarded 30
Prize Medals and Diplomas at various Exhibitions,
including Grand Prix, Brussels, 1897, and
Gold Medal Paris, 1900.**

THE AUTOTYPE COMPANY, LONDON & EALING DEAN.

Chas. Tyler & England Bros.,

Manufacturers of

Limited.

Photo Mounts, Photo Albums, Cameras & Sundries,
79, Copenhagen St., King's Cross,
London, N.

TELEGRAMS:-
 "ENGLAND, LONDON."

TELEPHONE:-
 375, KING'S CROSS.

THE DUDLEY PASTE-ON AND SLIP-IN MOUNT.

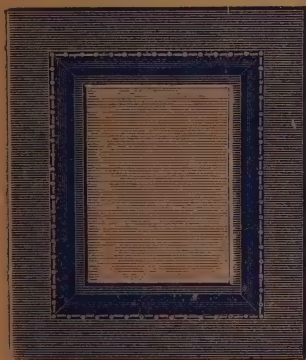
Embossed Tinted Plate Mark.
 Plain Edges.

In Four Combinations:-

- 1.—Dark Grey on Light Grey.
- 2.—Green on Dark Grey.
- 3.—Brown on Green.
- 4.—Dark Brown on Havanah.

For following pictures.—Per 100.

	PASTE-ON	SLIP-IN
Quarter-plate ...	4/6	8/6
Bullet ...	4/6	8/6
1A F.P. Kodak ...	4/6	8/6
F.P. Kodak ...	4/0	7/6
Carte-de-Visite ...	4/0	7/6
3½ × 2½ ...	4/0	7/6
Five by Four ...	7/0	11/0
Cabinet ...	8/0	14/0
Half-plate ...	10/0	15/0



THE EMPIRE PASTE-ON AND SLIP-IN MOUNT.

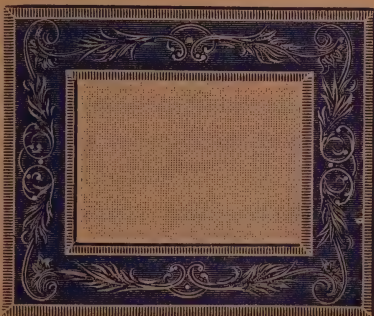
In Green Bristol, with Embossed Design.

Deckled Openings to Slip-in Series.

For the following size pictures.

PRICES.—Per 100.

	PASTE-ON	SLIP-IN
Prom. Midget ...	3/0	4/0
Brownie ...	3/0	4/0
F.P. Kodak ...	4/0	5/6
Bullet ...	4/6	5/6
Quarter-plate ...	4/6	5/6
1 A F. P. Kodak	4/6	5/6
5 × 4 ...	6/0	7/0
Cabinet...	7/6	8/6
Half-plate ...	9/0	10/6



The "Empire" R.R. No. 3.



OBLONG FORM,

WITH PNEUMATIC RELEASE.

The "Empire R.R. No. 3" is covered in the finest material obtainable, and is perfectly finished. It is fitted with Patent Spring Opening and Closing Arrangement at back, Specially Selected R.R. Lens working from $f8$ to $f64$ and can be focussed from 8 feet to 100 feet, Iris diaphragm improved Quadrant Shutter with well defined speeds, for Time, Bulb, or Instantaneous exposures, Two Brilliant View Finders, Infallible Changing Arrangement with Automatic Register, and Dust Cover to Lens.

The "Empire R.R. No. 2" is similar to the No. 3, but with focussing scale from 8 feet to 50 feet, and with Guillotine Shutter.

The "Empire No. 1" has an Achromatic View Lens, "Everset" T. & I. Shutter, and Iris Diaphragm working from $f11$, and is recognised as the best Guinea Camera on the market.

PRICES, COMPLETE, FOR TWELVE QUARTER-PLATES.

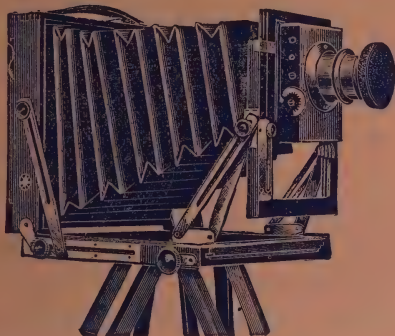
EMPIRE No. 1.	...	...	...	...	£1 1 0
EMPIRE R.R. No. 2.	(Pneumatic Release, 2/6 extra)...				2 10 0
EMPIRE R.R. No. 3.	(With Pneumatic Release)	...			3 3 0

CHAS. TYLER & ENGLAND BROS., LIMITED,

✻ “Kay Cee No. 3.” ✻

1902 Pattern.

With Swing Back and Swing and Rising Front.



The “Kay Cee No. 3” is made of very superior Polished Mahogany and is fitted with Double Extension Real Leather Bellows with Rack and Pinion Focussing, Improved Reversing and Swing back, Patent Wide Angle Movement, Polished Mahogany Double Dark Slide with Automatic Spring Catches, very superior Rapid Rectilinear Lens, Iris Diaphragm, Thornton-Pickard T. & I. Shutter with Speed Indicator, best Three-fold Ash Stand with Sliding Leg, and best quality Stitched Handle.

PRICES, COMPLETE OUTFIT.

QUARTER-PLATE	...	...	...	...	...	£3 5 0
HALF-PLATE	...	...	...	...	...	3 10 0
WHOLE-PLATE	...	...	...	...	...	5 17 6
Extra Double Dark Slides, 8/6 each.						

The same set Brass Bound and Very Highly Finished, including Three Double Dark Slides :-

Quarter-plate, £4 4 0 ; Half-plate, £5 5 0 ; Whole-plate, £7 7 0.
Extra Double Dark Slides, Brass Bound, 12/- each.

✻ Our Complete Catalogue of Cameras, Mounts and Sundries will be sent free on receipt of Trade Card.

79, COPENHAGEN STREET, LONDON, N.

THE TUDOR P.O.P. MOUNT.

In Green, Brown, Sepia, and Dark Grey Art Matt Boards with Embossed Tint round openings for following size pictures.

PRICES.—Per 100.

F.P. Kodak...	4/0
Quarter-plate ...	5/0
1 A F.P. Kodak ...	5/0
Bullet	5/0
Five by Four ...	6/6
Half-plate	9/6



CIRCULAR SIRDAR PASTE-ON AND SLIP-IN MOUNT.

Grey, White, Havanah, and Green.

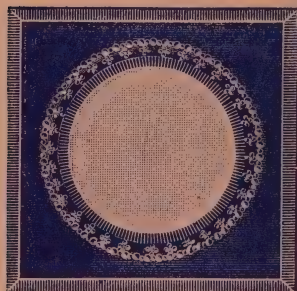
Handsomely Embossed.

For the following size pictures.



PRICES.—Per 100.

		PASTE-ON		SLIP-IN
Brownie	2/6	...	3/6	
Midget	2/5	...	3/6	
Carte-de-Visite ...	3/0	...	4/6	
Quarter-plate ...	3/6	...	4/6	
Cabinet	5/6	...	7/0	



A Complete Illustrated Catalogue of Mounts, Stand Cameras, Hand Cameras and Sundries together with a Sample Set of Photographic Mounts will be Sent Free to Wholesale Dealers only on application to.

Chas. Tyler & England Bros., Ltd.,

Manufacturers of

Photo Mounts, Photo Albums, Cameras, & Sundries,
79, Copenhagen Street, London, N.

NEW ZEALAND.

E. BEARDSLEY & SON,

Importers of every Photographic Requisite,
Magic Lanterns and Slides, and Limelight Outfits.

CORRESPONDENCE INVITED.

87, MANCHESTER ST., CHRISTCHURCH.

NEW ZEALAND.

WILLIAM PARK,

IMPORTER AND DEALER IN PHOTOGRAPHIC GOODS,
MAGIC LANTERNS AND SLIDES.

Cameras and Lenses by best English and Foreign Makers.

Goods sent to all parts of New Zealand and South Sea Islands.

WELLESLEY STREET EAST, AUCKLAND, NEW ZEALAND.

INDIA.

JOHN BLEES,

MANUFACTURER & IMPORTER OF PHOTOGRAPHIC GOODS & APPLIANCES.

John Blee's Cameras known to stand the Indian Climate.

JOHN BLEES AGENT TO ROSS, LTD. Price List Free.

ROSS' LENSES, LANTERNS, CAMERAS, &c.

Apply **JOHN BLEES, 18, Chowringhee Road, CALCUTTA.**

(NEAR THE GRAND HOTELS.)

FRANCE.

J. SCORY, Exporter of Glass for
Dry-plate Workers.

GLASS FOR TRANSPARENCIES AND MICROGRAPHY.

PLATE GLASS THIN AND EXTRA THIN.

GLASS EXTRA THIN A SPECIALITY.

ALL KINDS OF COLOURED GLASS.

I supply the most important firms in the world who use these goods.

4 & 6, Rue de Chateau-Landon, PARIS, FRANCE.

Telegraphic Address—"SCORY, PARIS."

INDIA.

BABAJEE SAKHARAM

AND COMPANY,

OF

ESUF BUILDINGS,

Opposite Gokuldas T. Hospital,

BOMBAY,

Supply every Requisite

FOR

PHOTOGRAPHY.

Photographic Goods

of every description.

PLATES, PAPERS,
FILMS, and
CHEMICALS

&c., &c.



HONG KONG
A. CHEE & CO.,
17a, Queen's Road, Central.



EASTMAN'S

KODAKS,

FILMS, and

ACCESSORIES.

AUSTRIA.

IMPORTANT NOTICE
For Dealers and Photographers.

THE BEST & CHEAPEST PHOTOGRAPHIC CARDS

(PRINTED AND WITHOUT PRINTING)

To be obtained in the first Austrian Photographic Mounts Steam Manufactory of
BERNHARD WACHTL, Vienna vii. Kirchberggasse, 37.

*Also the following Specialities:—*Protalbin Paper, Dry Plates, Albumenized Paper, Painted Backgrounds, Accessories in Wood and Papier Mâché, Cameras, Burnishers, Trays in Porcelain and Papier Mâché, Cut-out Mounts, Stephanie Vignettes, Detective and Hand Cameras, Glasses, Aristo Paper, Celloidin Paper, Bromide and Platinotype Papers, Lenses, Chemicals, Orthochromatic Plates, &c.

BOYD KAYE & CO.,

4, YUEN MING YUEN ROAD,

SHANGHAI.

**Sale Agents for ROSS' Lenses, Cameras, Prism Field
Glasses, Telescopes, Microscopes, &c.**

PRICE LISTS FREE.

HARRINGTON & Co., Ltd.

THE LEADING

Photographic Merchants,

66, KING ST., SYDNEY, and 93, QUEEN ST., BRISBANE,

With Agents in all the principal centres
throughout the Commonwealth of . . .

AUSTRALIA

The latest Cameras,
Lenses and every . . .
conceivable requisite
and novelty in stock.

FREE USE OF DARK ROOM FOR TOURISTS.



HARRINGTON & Co., Ltd.,
are Publishers of

The Australian Photographic Journal.

Established 1892.

Published Monthly, 4d.

The Best Photographic Advertising Medium in Australasia.



NOTICE TO . .

Manufacturers of Photographic Goods.

Our facilities are unequalled for introducing
and making a demand for Photo Goods
throughout Australasia

Correspondence invited—

English, French, German, Italian.

INDIA.

NADKARNI & CO.

19, ESPLANADE CROSS ROAD,
(OPPOSITE ST. XAVIER'S COLLEGE)

BOMBAY.

THE ACKNOWLEDGED PREMIER HOUSE IN INDIA
FOR

**PHOTOGRAPHIC, DRAWING, AND
ARTISTS' MATERIALS.**

Price Lists free on application.

**TRANSVAAL
Photographic Stores**

J. BARNETT & CO.,

P.O. Box 763, Rissik Str., Johannesburg,

IMPORTERS AND DEALERS IN

ALL PHOTOGRAPHIC REQUISITES.

Amateurs' Plates and Films Developed, Printed, and Mounted.

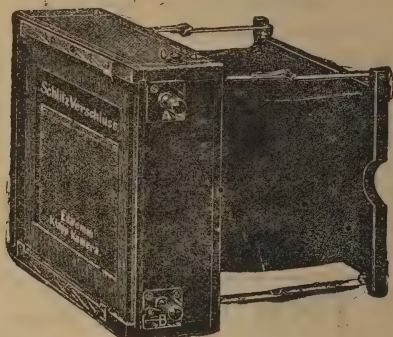
Kodak Cameras and Accessories. . .

. . . Fresh supply of Kodak Films monthly.

CORRESPONDENCE INVITED.

Essemm Klapp Camera.

Quarter-plate, with Focal-Plane Shutter.



Covered in Black Pegamoid, Focussing Screen, Strong Folding Mechanism, View Finder, Two Bushes, Adjustable Shutter Speed, Leather Bellows, **Extra Rapid Rectilinear Lens, working at f/8**, with Iris Diaphragm and Focussing Jacket, from one yard up to infinity, Lens Cover, including three Double Slides, Quarter-plate size.

70/- RETAIL.

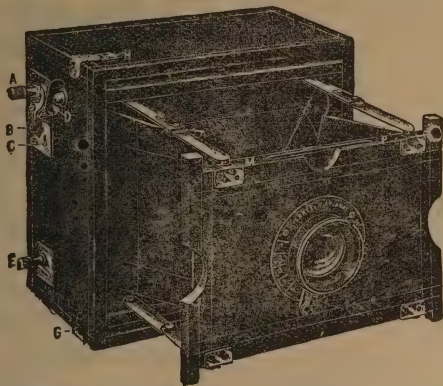
GOOD DISCOUNT TO DEALERS.

SOLE MANUFACTURER—

ROMAIN TALBOT, Berlin, C.

Kaiser Wilhelm Strasse, 46.

The Only Film Camera with
Focal Plane Shutter
 IS THE
BOTT Film
 Camera



**For Daylight Spools, $4\frac{1}{4}$ inches, producing
 Negatives $3\frac{1}{4}$ by $4\frac{1}{4}$ inches.**

Covered in Black Leather, Strong Folding Mechanism, View
 Finder, Two Bushes, Adjustable Shutter Speed, Leather Bellows,
Extra Rapid Rectilinear Lens, working at $f/8$, with Iris
 Diaphragm and Focussing Jacket, from one yard up to infinity.
 Lens Cover. Size— $\frac{1}{4}$ plate.

95/- RETAIL.

GOOD DISCOUNT TO DEALERS.

SOLE MANUFACTURER—

ROMAIN TALBOT, BERLIN, C.
 Kaiser Wilhelm Strasse, 46.

STEINBACH & CO.

MANUFACTURERS OF

MALMEDY (RHENISH PRUSSIA.)

Photographic Papers

In well-known superior quality, for all processes, as—

Plain Papers

FOR Solar and Crayon Work.
Platinotype Process.
Bromide Process.

FOR Copying Drawings and Plans for
Ferro-Prussiate, Heliographic, and
Sepia Processes.

Baryta

Paper

FOR Aristo, Collodion, and Bromide Processes.

SOLE AGENTS FOR GREAT BRITAIN & IRELAND—

Messrs. OTTO KÖNIG & CO.

27, Cross Street, Finsbury Pavement, LONDON, E.C.

IN EVERY STATIONER'S, RAILWAY STATION, & KIOSK
YOU CAN OBTAIN

PHOTO-REVUE

The Journal for Photographers and Amateur
Photographers. Every Sunday.

CHARLES MENDEL, MANAGER.
PARIS. 118, Rue d'Assas, PARIS.

SUBSCRIPTION (52 issues).
France 6fr. Foreign Lands 8fr.

The **Photo-Revue** was created for popularising and extending Photography, for defending the interests of photographers, for investigating and publishing everything of interest in photographic lines.

The **Photo-Revue** is actually in the hands of all who are connected with photography. The circulation of **Photo-Revue** is undoubtedly the greatest, and exceeds that of all independent French photographic organs together.

The **Photo-Revue** is a public tribune always open for, and gives, information by letter or post-bag to all who call for special knowledge of the editors.

The **Photo-Revue** contains every week a **Review of Novelties, Patents List, Situations vacant, wanted**, and all information or **Commercial Advice** useful to the photographic trade.

For **Trade Announcements**, private **Sale or Exchange, Situations vacant or wanted**, and, in a word, for all advertisements reaching the photographic public, the **Photo-Revue** is the most efficacious medium.

1,083,600

COPIES WERE ISSUED DURING LAST YEAR.

CHARLES MENDEL, 118, Rue d'Assas, Paris

*Universal Exhibition, Paris, 1900, GOLD MEDAL awarded
by the International Juries.*

Annuaire

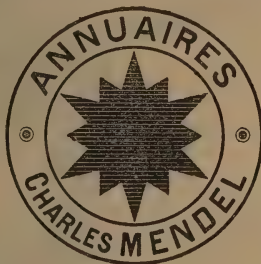
.. du ..

Commerce et de l'Industrie Photographiques EN FRANCE ET A L'ETRANGER.

THIS ANNUAL CONTAINS:

- I.—A General List of Manufacturers of Photographic Materials classed by order of Specialities, in 710 chapters.
- II.—A General List of Dealers, classed by order of Localities.
- III.—A Repertory of all Trade Marks and appellations usually given to many Photographic Apparatus, Sundries, Specialities, &c.

**600
Pages
of
Condensed
Text.**



**In
French,
English,
German,
Spanish,
Italian
Languages.**

PRICE: EIGHT SHILLINGS.

Monthly Review of the .. Photographic Trade & Industry. (*L'Information Photographique.*)

CIRCULATION—Is posted to all Photographic Dealers in the World, Commission Agents, &c.

CONTENTS—Every Information and Advice of interest to the Photographic Community.

Subscription: EIGHT SHILLINGS.

FRANCE.**CL. GUERRY'S****Pneumatic Shutter**

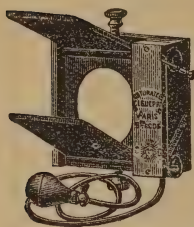
(PATENTED)

59, Avenue de la Republique, PARIS.**Single Flap
Shutter.**

Suitable for the
Studio. Placed
before the Lens or
in the Camera.
Aperture from
4 to 22 cm.

**SILVER
MEDAL,
UNIVERSAL
EXHIBITION,
PARIS, 1900.**

**The Simplest
The Strongest
Noiseless**

**Double Flap
Shutter.**

This Shutter gives
prolonged fore-
ground exposures,
and is available for
ordinary time and
instantaneous work.
Aperture from 4 to
13½ cm.



Shutter, with Electric contact, for automatic ignition of Magnesium powder.
To be obtained at the Principal Dealers in Photographic Materials.

E. KRAUSS,

21 & 23, RUE ALBOUY, PARIS.

OPTICIAN AND MANUFACTURER OF
HIGH-CLASS OPTICAL INSTRUMENTS.

London Branch: A. E. Staley, 35, Aldermanbury, E.C.

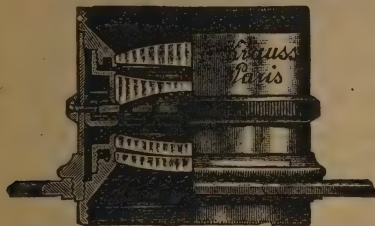
Manufacturer under Licence of the celebrated Photographic Lenses, **Krauss-Zeiss**, which are the finest Lenses made, and used by the most eminent professionals and advanced amateur photographers.

All descriptions of Lenses made to suit every requirement of Photographers, with aperture from $f/3.6$ to $f/18$.

The "**PROTAR**," SERIES IIA, $f/8$.—This Model has been adopted by a very large number of Makers and Amateurs, has great rapidity, large covering with full aperture, and perfectly sharp definition with large field.

PROTAR, SERIES IIIA, $f/9$.—Universal Lens for General Work, Rapid and Large Field, with splendid definition.

THE "UNAR" Krauss-Zeiss.

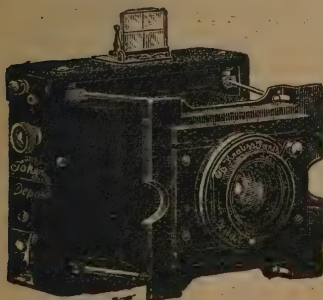


SERIES IB, $f/4.5$ and $f/5$ for the most rapid work; the latest model, $f/6.3$ very portable, specially recommended for hand cameras.

Most of the designers and manufacturers of Stand Cameras, as well as the public are now giving the preference to the

New Krauss-Zeiss Lenses.

THE NEW "TAKYR" CAMERA.



This is the latest form of folding Camera, fitted with focal plane "Blind Shutter," with adjustable slit actuated from the exterior of Camera, enabling it to be adjusted for the one-thousandth of a second, or any longer exposure desired. They are fitted with the celebrated "**Krauss-Zeiss Unar Lenses**," having open aperture $f/4.5$ and $f/5$. 250 per cent. more rapid than any other Lenses.

The most perfect Camera existing.

Size 5×4 , 3 double dark slides (*à rideau*) with Unar Lens, Series IB, $f/4.7$, focus $5\frac{1}{2}$ in. £12 5 0
 1-plate ditto, ditto, focus $5\frac{1}{2}$ in. Unar No. 4 $f/4.5$ £11 15 0
 Size $\frac{1}{2}$ -plate, or $6\frac{1}{2} \times 4\frac{1}{2}$, with Unar, $f/5$, focus $8\frac{1}{2}$ in. £17 15 0

STEREOSCOPIC SIZE, $6\frac{1}{2} \times 3\frac{1}{2}$, $5\frac{1}{2}$ in., with 3 double dark slides (*à rideau*), fitted with a pair of Unar Lenses, Series IB, $f/4.5$, focus $5\frac{1}{2}$ in. £20 5 0

These Cameras are particularly adapted for the most rapid work: Yacht-racing, Horse-racing, Polo-playing. The extreme rapidity of the lenses also enable these Cameras to be used in a dull light, when other Cameras would be useless. Their compact form enables them to be easily carried, bicycling or mountaineering.

INDIA, BURMAH & CEYLON.

THE BOMBAY PHOTO STORES

LATEST NOVELTIES

IN

**Photographic
Apparatus.**



D. M. DUKLE & CO.



By SPECIAL
APPOINTMENT

— TO H. E. —

THE GOVERNOR OF BOMBAY.

FORT, BOMBAY.

C. E. GARDNER & CO., LTD.,

Wholesale Druggists and Dealers in
Photographic Supplies,

PORT ELIZABETH, SOUTH AFRICA,

Are prepared to receive Samples and Quotations for all kinds of
Photographic Material. These should be sent to our London
Agents, Messrs.

TOZER, KEMSLEY & FISHER, Ltd., Leadenhall Buildings, E.C.

PHOTOGRAPHIC OUTFITS.

The most Perfect and Convenient CAMERAS,
fitted with unequalled

Ross, Ross-Zeiss, or Ross-Coerz Lenses.

LISTS FREE.

ROBINSON & CO., Merchants, Singapore.

The Oldest and Most Influential Photo Depot in

Cheapest

BURMA.

Most Reliable

D. A. AHUJA, Photographic Dealer and Artist,**87, DALHOUSIE STREET**

(facing Su'le Pagoda),

RANGOON,

Invites Manufacturers of Photographic Requisites of every description to send PARTICULARS, and if possible SAMPLES, of their NOVELTIES, giving the very best terms.

TASMANIA.**PERCY ASH,** Chemist,**84, ELIZABETH STREET, HOBART.**

— ESTABLISHED 1855 —

Wholesale & Retail Dealer in Photographic Material,
Drugs, Chemicals, Chemical and Scientific Apparatus, &c.
A large DARK ROOM available for use of Customers.

THE**AMERICAN AMATEUR PHOTOGRAPHER.****Established 1889.**

*Leading Photographic Journal of the United States and Canada, Edited by
Dr. JOHN NICOL and F. C. BEACH.*

Issued on the first of every month, each number contains many illustrations and articles by able writers, picture criticism, description of new apparatus, new formulæ, &c.
Subscription price, U.S. and Canada \$1.50 per year, Foreign Countries \$2 post free.

Specimen copies ten cents. None Free.

**AMERICAN PHOTOGRAPHIC PUBLISHING CO., 361, Broadway,
New York, U.S.A.**

AIR BRUSH,

Although a new Art Tool, is quite favourably known by all classes of American Artists.

Use any liquid pigment on any surface from velvet to glass.

BEWARE OF IMITATION. PARTICULARS FREE.

Address: **AIR BRUSH MFG. Co., 107 Nassau St. Rockford, Ill. U.S.A.**

THE WORLD'S HEADQUARTERS FOR BACKGROUNDS.

200 New Effects now Ready

FOR THE

SEASON OF 1902-03.

We will Mail our new **Illustrated Catalogue of Designs** post-paid, free, to any address on earth, upon application.

LIBERAL DISCOUNT TO DEALERS.

Address :

W. P. BUCHANAN,
PHILADELPHIA, PENN., U.S.A.

C.P.S. PHOTO SPECIALITIES.

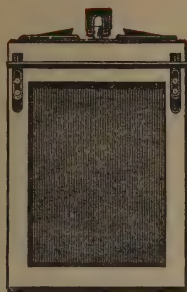
Preston's Developer, Pyro (concd.)	...	...	...	1/3 and 2/-
" " Hydrokinone	...	...	...	1/3 and 2/-
" " " and Metol	...	...	...	1/3 and 2/-
" " " and Eikonogen	...	...	...	1/3 and 2/-
" " Ferrous Oxalate	...	...	...	1/3 and 2/-
" Toning and Fixing ..	...	...	...	1/2 and 2/-
" (concentrated)	...	...	...	1/6
" Varnishes, Hard, Trans., Matt, Black or Ferrotype	...	...	...	6d and 1/-
" Dry Powders for Developing, Ortol-Soda,	...	...	...	5d; Amidol, Metol,
8d, Metol-Quinol, 3d, Eikonogen-Quinol, Pyro-Soda,	...	...	...	Pyro-Meto', Hydrokinone, 4d each; Adurol-Dianol, 2/-
each; Pyro-Crystals, 1/- oz.; Glycin, 2/-; Adurol, 2/-;	...	...	...	Diamidophenol-Hyd., 2/6.
" Dry Powders for Toning, Gold and Sulphocy	...	...	...	5d
" Toning and Fixing	...	...	...	1/6
" Hypo or Acid-Hypo Fixing	...	...	...	2 1/2d.
" Intensifiers (Uranium or Mercury), Agfa.	...	...	...	6d and 1/-
" Hypo Eliminators. Thiocarbamide	...	...	...	1/6
C.P.S. Achieved Mountant, for Gelatine Prints	...	...	...	1/- and 2/6
(Approved by Best Photographers)				

PRESTON'S PHOTO STORES,

(40 years Established Photo Manufacturer)

56, FARGATE, SHEFFIELD.

Roll-film and Magazine Systems *Superseded.*



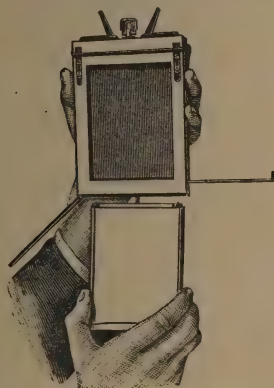
SHUT.

The
"RAJAR"
 CHANGER,
 FRONT
 VIEW.



HALF OPEN.

THE "RAJAR" SYSTEM.



Loading the "Rajar" Changer
 with a Sealed Case of Films.



The "Rajar" Changer in use.
Note! The Changer is always closed when
 a Film is ready for exposure or has been
 returned to the Case.

THE "RAJAR" SYSTEM



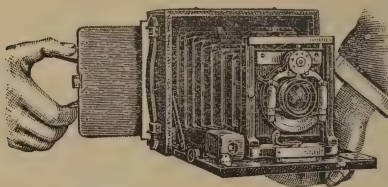
DAYLIGHT

LOADING & UNLOADING

FLAT FILMS.

THE "RAJAR" System is a REVOLUTION in Photography. It is not an **Evolution**. It is not merely an improvement of existing systems. It goes straight to the root of Photography, and taking its simple elements only, has imprisoned them in an Apparatus the same size as a double dark slide.

For more than 20 years, all ranks and classes of photographers have yearned for a system that would enable them to do equally good and serious work as obtained by the dark slide system:—



The "Rajar" Changer in use.

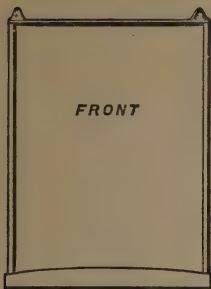
- 1—Without going to a dark room to load;
- 2—Without going to a dark room to un-load;
- 3—Without the necessity of frequent loading;
- 4—With the lightest possible medium;
- 5—Without weighty or bulky packing of the mediums;
- 6—Without increasing the weight of the Camera;
- 7—Without increasing the bulk of the Camera.

Changing the Films—The Slide is pulled out and pushed home to place a film in the exposure aperture; and to return the film from the exposure aperture to the film case, the same movements only have to be repeated; the Changer itself doing this in regular sequence without any call on the operator, other than pulling out and pushing home the slide.

The "RAJAR" system, now put on the market in the form of a Changer, **absolutely and completely** fills the gap—meeting all the felt wants, giving all the advantages of the dark slide roll-film and magazine systems, and many new features peculiar to it alone. With a "RAJAR" Changer, used on a dark slide camera in the place of the double dark slide, you immediately possess a camera that is daylight loading and unloading even in the most brilliant sunshine.

The "RAJAR" Changer will fit any dark slide camera. You can focus any or every picture on the ground glass focussing screen.

The "RAJAR" films are packed in light-tight tin cases, 10 in each packet.



A Case of "Rajar" Films.

- 1—The Films are Thick;
- 2—And Without Separators;
- 3—One Film, one Picture;
- 4—They are held as flat as glass plates in the exposure aperture;
- 5—One or any number of films can be extracted for developing without interfering with those not exposed;
- 6—They lie flat and do not curl during developing;
- 7—They pack into 25 per cent. less space than roll films;
- 8—There are no numbers to mark off on the films.

The...

"RAJAR"

CHANGER REFUSES to
Work UNLESS a FILM
is PRESENT.

General Advantages

of this SYSTEM.

- 1—The Changer can only work the correct way.
- 2—Any number of stiff flat films may be exposed and changed in
- 3—The picture may be focussed before exposure. [daylight.
- 4—Separate exposures may be developed if required.
- 5—The films are absolutely flat during exposure.
- 6—Every exposure is indicated.
- 7—The changing system is certain in action.
- 8—Double exposure is impossible.
- 9—The Changer refuses to work unless a film is present.
- 10—The stiff films never curl, and are developed exactly like glass
- 11—Dark slides may be used with the same camera. [plates.
- 12—There is no cutting of films required.
- 13—The camera can be made smaller and more compact than any magazine or roll film camera.
- 14—The system is suitable for either hand or stand cameras.
- 15—A dark room is only required for developing.
- 16—The films being packed in tin cases without any packing material against the sensitive surfaces will keep well, and are pre-eminently suitable for use in tropical countries. The films as sold are packed ready for export.
- 17—A self-capping shutter on the lens is not required.

PRICE LIST "RAJAR" Changer.

OF



$\frac{1}{4}$ -Plate "RAJAR" Changer - £1 5 0

This Changer is designed to fit the standard pattern Cameras.

Adapters to enable this Changer to be used on any size or special make of Camera - **0 2 6**

And upwards, according to pattern.

For **Special Adapters**, the Camera and one Dark Slide must be sent to the Works.

When a Camera requires fitting to use the "**RAJAR**" Changer, it is not altered in any way, and can be used as before when desired.



PRICE LIST "RAJAR" Films. . .

OF



$\frac{1}{4}$ -Plate Special Rapid Films 2/6 per box of 10.
(In Tin Cases).

These Films are of the highest quality, coated on thick celluloid or xylonite. The emulsion is very rapid (200 H & D, 200 Watkin, 111 Wynne), and yet yields negatives with fine gradation and density. The Films are too thick to curl up, are developed just like plates, and always lie flat.



A Special Camera embodying this System, and other sizes of Changers and Films are in preparation.



From all DEALERS, or

THE

Brooks-Watson Daylight Camera Co.

...LIMITED,

Abercromby
...Works,

GT. HOMER STREET,

Telegrams—"FILMS."
Telephone—5194.



LIVERPOOL.

H. KUNTZEN & CO., LONDON,

MANUFACTURERS OF



White
Wood Printing
Frames,

in 3 qualities.

Fancy Leather
Plush & Moulding
Frames.

Wholesale only.

Sample Sets
from
10s. 6d. to
£1 1s.



Established 1880.

Photographic Outfits and Supplies, Agent for the

SILENT

PRICE \$5 POSTAGE 25c.

PORTRAIT

High Grade Aristo, Platino, and other Printing
out papers mailed to all parts. Made in the
following sizes: 2, 2½, 3, 3½, and 4 inches, \$5.00.

SHUTTER.

Estimates and Catalogues on Application.

**MINOTT M. GOVAN, Manhattan Building, 15th
Street, and 5th Avenue, New York.**

ROSS, ROSS-ZEISS, & ROSS-GOERZ**Photographic Lenses,**

**Cameras, Enlarging Lanterns, Prism Binoculars,
Telescopes, Microscopes, &c.**

J. SPARROW,**78, Brisbane Street, Launceston, TASMANIA****WILFRED EMERY,**Established
1886.**High Road, Cricklewood, N.W.,****PRINTER AND ENLARGER.**

Expert Film Developing. Also Copying, Lantern Slide Making, &c.

Every kind of work for Amateurs, the Profession and Photo Dealers.

Special Lists on application.

Sole Manufacturer of the celebrated "APEK" Hand Cameras, Sets, Lenses, &c.

BEWARE OF IMITATIONS. There are no "others just as good."

The "Apek" goods are "English—quite English, you know."

Camera Repairs Promptly executed. Goods by all Makers at Lowest Prices.

CLÉMENT & GILMER,
Manufacturers of Photographic Lenses, Cameras,
Enlarging Apparatuses, &c.,
140, FAUBOURG ST. MARTIN, PARIS.
 (London Office:—1, 2, & 3, Holborn Circus, E.C.)

ESTABLISHED A.D. 1860.

Medals awarded: Berlin, 1865; Toulouse, 1877; Paris, 1878, 1879, 1889; Florence, 1887; Chicago, 1893; Glasgow, 1901.
 Paris Exhibition, 1900.—Gold Medal, Cross of Chevalier of the Legion of Honour.

PANORTHOSTIGMAT. SERIES 1, F/7, ANGLE OF VIEW ABOUT 80°, IRIS DIAPHRAGM, JENA GLASS.

THIS Lens is perfectly corrected for the chemical focus, that is to say that the optical and visual images are absolutely coincident. Its advantages are the following:—

The angle of field attains 80°, in consequence of which it will cover a plate of a size larger than for which it is listed.



A NEW ANASTIGMAT LENS.
. PERFECT and CHEAP. .

Instantaneous pictures can be made by them, at any season, of admirable crispness. They may be used for all classes of work: portraits and groups, landscapes and copying. Their focal lengths have been calculated so as to avoid all defects in perspective. The focal point does not vary with the change of diaphragm.

No.	Equivalent Focus.	Covers at F/7	Covers at F/16	Covers at F/44	PRICE.
* 1	5½ in.	4½ × 3½	5 × 4	6 × 5	£3 8 0
* 1 bis	6½ "	5 × 4	6 × 5	7 × 5	4 2 0
* 2	7½ "	6½ × 4½	7 × 5	8½ × 6½	4 16 0
* 3	10½ "	8½ × 6½	10 × 8	12 × 10	6 16 0
4	12 "	10 × 8	12 × 10	14 × 11	8 4 0
5	14 "	12 × 10	14 × 11	15 × 12	10 16 0

*** TELEPHOTO ATTACHMENT, £2.**
 (Lenses matched for Stereo work without extra charge.)

At full aperture perfect sharpness is obtained over the complete surface of the plate. The sharpness at the angles attained is one-tenth of a millimetre (type of sharpness adopted by the laboratory of THE SOCIÉTÉ FRANÇAISE DE PHOTOGRAPHIE). Its focal volume is uniform for the whole surface of field.

The best rectilinear lenses of the old construction must be stopped down to *f*/16 to obtain the same crispness; consequently, for an equal surface sharp covered these new lenses are four times more rapid.

These lenses can be assimilated, by the results obtained, with those of the best English and German makes so much in vogue amongst amateurs, and they are much cheaper.

FRANCE.

**EAGLE COMBINATION LENSES.**

Iris Diaphragm in Morocco Case, Velvet Lined.

No. 1. $6\frac{1}{2} \times 4\frac{1}{2}$, 4 lenses, 6 combinations ... £4Rapid Rectilinear ... Focus, $7\frac{1}{2}$ in., F/8Rapid Mid-angle ... " $6\frac{1}{2}$ in., F/11Wide-angle ... " $4\frac{1}{2}$ in., F/16

Landscape ... " 9, 11, & 15 in.

No. 2. $8\frac{1}{2} \times 6\frac{1}{2}$, 4 lenses, 6 combinations ... £6

Rapid Rectilinear ... Focus, 10 in., F/8

Rapid Mid-angle ... " 8 $\frac{1}{2}$ in., F/11Wide-angle ... " 6 $\frac{1}{2}$ in., F/16

Landscape ... " 12, 14, & 20 in.

No. 3. 10×8 , 6 lenses, 8 combinations ... £9

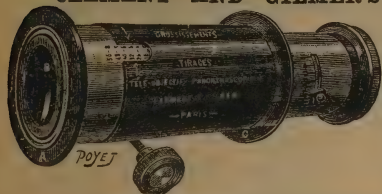
Rapid Rectilinear ... Focus, 12 in., F/8

Rapid Mid-angle ... " 10 in., F/11

Wide-angle ... " 8 in., F/16

Extreme-angle ... " 6 in., F/20

Landscape ... " 12, 16, 18, & 24 in.

CLEMENT AND GILMER'S TELE-PHOTO LENSES.

A new application of the Panorthoscopic Lens (R. R. Lens of superior class $\frac{7}{8}$ made of Jena Glass) to the Photography at long distance. The tele-objective can be used on any Amateur Stand Camera with double extension bellows. Pictures are of great sharpness even with the highest amplifications. Exposures very short.

The "Panorthoscopic" Lens detaches for ordinary work; portrait, groups, landscapes, street scenes.

PRICES INCLUDING THE PANORTHOSCOPIC.

PANORTHOSCOPIC ALONE.

	In Brass.	In Aluminium.	Brass.	Aluminium.
No. 0 3 to 8 times for $\frac{1}{2}$ -pl. Cameras	£4 0 0	£5 8 0	£2 8 0	£2 17 8
No. 0 bis 4 " 8 " " $\frac{1}{2}$ -pl. "	5 4 0	7 4 0	3 8 0	4 1 8
No. 1 5 " 10 " " $\frac{1}{2}$ -pl. "	6 8 0	8 16 0	4 12 6	5 10 6
Set of Yellow Screens in case, 8/-. No. 0 Tele-photo Lens is adaptable to Hand Camera work				

CLEMENT AND GILMER'S RAPID EURYSCOPE, F/6,

Jena Glass. A Rectilinear Portrait Lens for Studio, and quickest working lens for Landscapes and Groups.

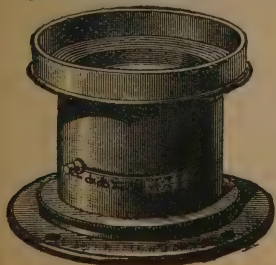
	5 $\frac{1}{2}$ -in.	7-in.	10 $\frac{1}{2}$ -in.	11 $\frac{1}{2}$ -in.	15-in.	17 $\frac{1}{2}$ -in.
Back Focus " " "	5 \times 4	7 \times 5	9 \times 7	10 \times 8	12 \times 10	15 \times 12
In Brass Mounts ...	£2 17 0	£4 5 0	£5 0 0	£5 14 0	£8 0 0	£12 0 0
Bright Aluminium Mounts	3 8 5	5 2 0	6 0 0	6 16 10	9 0 0	13 4 0

NEW SLOW-TIME SHUTTER.

A new Curtain Shutter with winding rack-wheel suppressing the string and regulated for speeds from 2 seconds to 1-100th.

This is a very effective Shutter, solidly constructed, and perfectly light proof for time and instantaneous work.

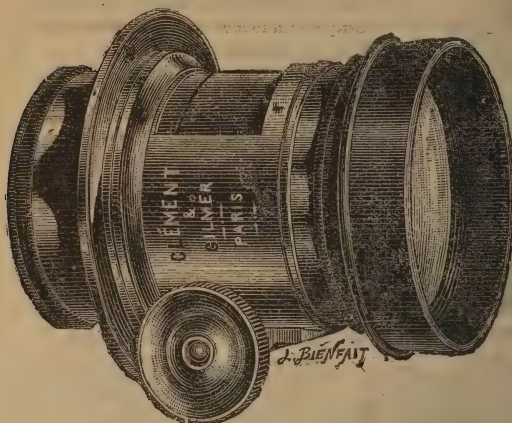
Prices for R. R. Lenses—



$\frac{1}{10}$ - $\frac{1}{10}$ - $\frac{1}{13}$ plate.

(Say if for front or back of the lens. If for front, state diameter of the hood.)

RAPID PORTRAIT LENSES F/4.



THESE Lenses, worked accurately and made of the whitest material, excel in sharpness of definition, and they are free from distortion.

We recommend them to photographers as giving the best possible results for portraits and groups in the studio.

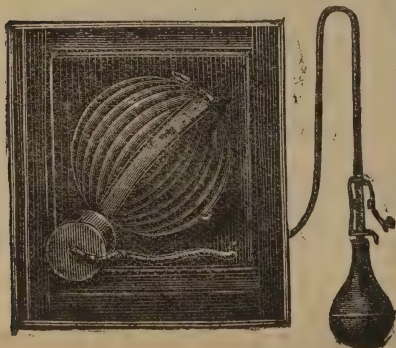
Children can be photographed successfully even by a dull light.

They render some great services for enlarging purposes by day or artificial light. We have adopted them on our "Cantilever" enlarging lanterns.

No.	Diameter of Lenses.	Equiv. Focus.	Price with Waterhouse Stops.	Price with a set of Iris Stops.
350	... 1½ in. ...	6 in. ...	£0 19 3	£1 4 0
351	... 2¼ " ...	7½ " ...	1 12 0	1 17 0
352	... 2¾ " ...	9½ " ...	2 0 0	2 7 0
353	... 2¾ " ...	11 " ...	2 12 0	3 0 0
354	... 3⅞ " ...	12½ " ...	4 0 0	4 10 0
355	... 3½ " ...	14 " ...	6 0 0	6 15 0
356	... 4½ " ...	16½ " ...	10 0 0	11 0 0

The front lens can be screwed at the back of the tube for landscape and copying purposes, using the small diaphragms.

The distance necessary to produce a full-length portrait from a person 5½ feet high is obtained by multiplying this length by the number resulting from the division of the focus by 2½ inches (C. de V.), or 3½ inches (Victoria), or 4 inches (Cabinet).

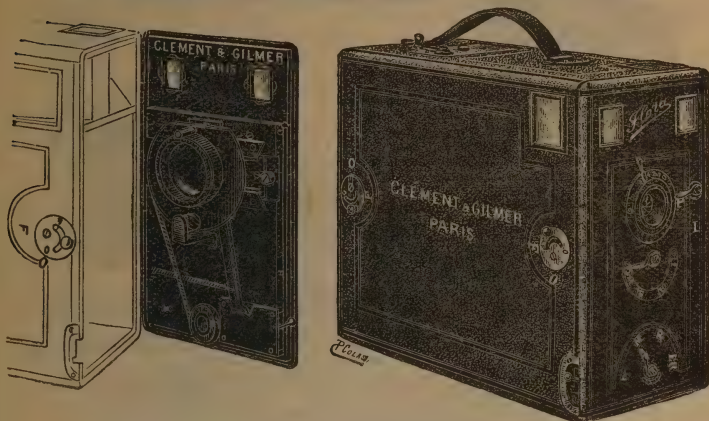


GRUNDNER'S STUDIO SHUTTER.

The most recommendable Shutter for studio work, consisting of a round leather bellow opening from the centre, mounted on a metallic frame with three clamp screws for adjusting on the lens tube and inside of the Camera. No shaking, no noise.

For lens of 2½ in., 16/-; 2¾, 16/10
 3¼, 17/8; 3½, 18/6; 4, 19/3; 4¾,
 21/3; 4¾, 22/10; 5½, 24/10;
 5½, 26/6; 5¾, 28/-; 6½, 30/-; 6¾,
 33/8; 7½, 35/3; 7½, 36/10;
 7½, 38/10.

FRANCE.

THE "FLORA" HAND CAMERA.For 12 Plates, $\frac{1}{4}$ size.**COVERED IN BEST DRESSED GOATSKIN.****HIGH-CLASS WORKMANSHIP AND FINISH.**

The following points will recommend it to the most scrutinising Amateur:—

1. The front of Camera can be instantly opened, which permits the cleansing of Lens and View Finders; also gives access to the working parts of Shutter.
2. The Achromatic Lens works at a large aperture, and will take instantaneous views with fine definition. It is fitted with a spiral action focussing adjustment, and has a range from 10 ft. to infinity. Also Iris Diaphragm.
3. The Shutter is constantly set, and is released by a small lever. It works at varying speeds.
4. The Finders are those known as the Crystal Brilliant, and show the image the right way up
5. The Plates fit into sheaths, which are threaded on a double curved rod. The changing action is most perfect, and cannot deteriorate or get out of action. A lever on the top releases the plates alternately, and an automatic counter registers each plate as it falls.

Price £2. With Rapid Rectilinear Lens, £3 10s.

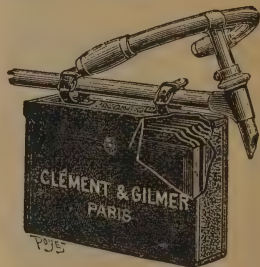
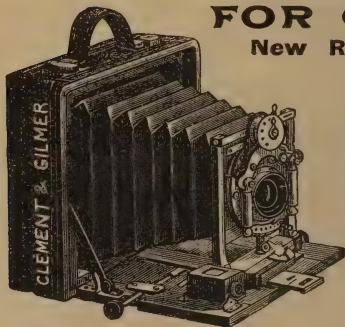
"Mignon" Tripod Metal Stand, Triangular, Automatic for same, 12s.
(Closes to 11 inches, extends to 48 inches)

FRANCE.

A Photographic Marvel

FOR CYCLISTS!

New Reduced Prices.



The Pocket Ultra Camera

is the smallest of the "Folding" type that can be realised.

The following specification will, no doubt, satisfy, if not astonish, the most ardent and critical amateur :—

1. The Body is made of Mahogany, polished inside.
2. It is covered with best Morocco leather.
3. The cone-shaped Bellows is of best leather.
4. Horizontal and Vertical Movements at front.
5. Focussing Adjustment by rack and pinion motion, also engraved plate for [focal distances.
6. Double-action Swing Back.
7. Ground-glass Focussing Screen in frame set on springs, permitting the insertion of dark slide behind.
8. A Roll Film-holder, or Changing-box, can be adapted when required.
9. The finder pivots for use in both positions.
10. The Camera can be screwed to a Tripod Stand.
11. The Double Dark-slides are extra light; weight, 2 ozs.
12. The Objective is a Rapid Rectilinear, F8, of our best quality.
13. The Shutter works between the Lenses, it gives both Time and Instantaneous Exposures, is fitted with both Finger and Pneumatic Releases, Speed Indicator, and Iris Diaphragm.
14. The Carrying Case is of best Morocco, velvet lined, is provided with sling, also short straps for attachment to cycle frame.

The Camera for Plates $4\frac{1}{2} \times 3\frac{1}{2}$ measures $6 \times 5 \times 2\frac{1}{2}$ ins., and weighs 1 lb. 14 oz.

The same in Carrying Case with 3 Dark-slides measures $10 \times 6\frac{1}{2} \times 3$ ins., and weighs 3 lbs.

The Camera for Plates $6\frac{1}{2} \times 4\frac{1}{2}$ measures $9 \times 7 \times 3$ ins., and weighs 3 lbs.

The same in Carrying Case with 3 Dark-slides measures $9 \times 7\frac{1}{2} \times 4\frac{1}{2}$ ins., and weighs 6 lbs.

		$4\frac{1}{2} \times 3\frac{1}{2}$	$6\frac{1}{2} \times 4\frac{1}{2}$
A.	With Best Rapid Rectilinear Lens	£6 0 0	£8 0 0
B.	With Clement & Gilmer's Panorthostigmat, F7	8 4 0	11 4 0
	Extra Dark-slides	0 7 3	0 8 0

"Mignon" Tripod Stand, Triangular, Automatic, 12s.
(Closes to 11 inches, extends to 48 inches.)

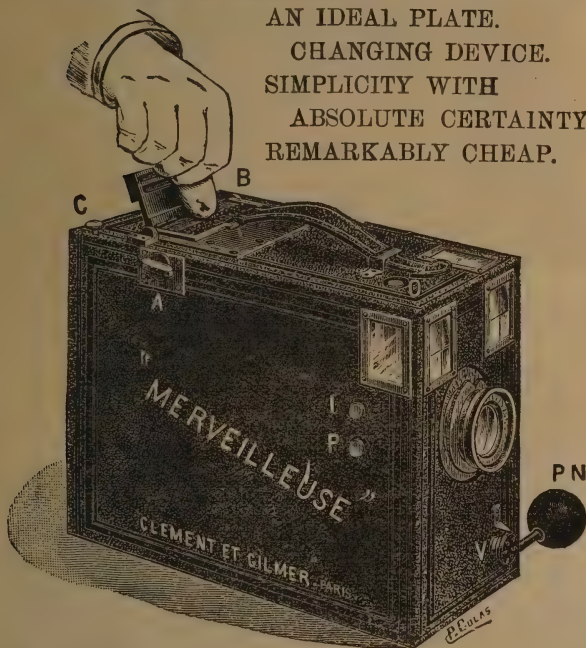
[See preceding and following pages.

FRANCE.

THE MERVEILLEUSE.

UNIQUE IN THE WORLD.

AN IDEAL PLATE.
CHANGING DEVICE.
SIMPLICITY WITH
ABSOLUTE CERTAINTY.
REMARKABLY CHEAP.



Direct action proclaimed the only sure method.

A touch of the tip of the thumb releases the exposed plate instantly.

No failure by clogging or jamming of plates possible. The pressure from the thumb tilts each plate forward in succession, hence the action is under the entire will and control of the operator.

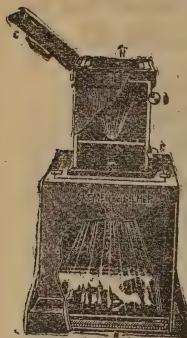
The Camera is covered with fine morocco leather. Is fitted with a very good R.R. lens, iris diaphragm, and spiral motion focussing adjustment, a metallic shutter with varying speeds released by press button or pneumatic action, two clear vision finders, two bushes for tripod screw.

Carries 12 Plates, Quarter size. Price £3 10s.

"Mignon" Tripod Metal Stand, Triangular, Automatic, 12s.
(Closes to 11 inches, extends to 48 inches.)

[See preceding and following pages,

Photographic Enlargers.



NEW AUTOMATIC ENLARGER, . . With outside indicators.

The Upper Camera packs into the other one for travelling.
No. 1 to enlarge negatives on glass or films $3\frac{1}{2} \times 2\frac{1}{2}$ and $4\frac{1}{2} \times 3\frac{1}{2}$ up to $6\frac{1}{2} \times 4\frac{1}{2}$ and 10×8 .

Price £4 (including R.R. Lens Iris Stops).

Extra carriers, $\frac{1}{8}$; special dark slide for reduction $\frac{16}{-}$.

No. 2 to enlarge negatives on glass or films $4\frac{1}{2} \times 3\frac{1}{2}$ and $6\frac{1}{2} \times 4\frac{1}{2}$ up to $8\frac{1}{2} \times 6\frac{1}{2}$ and 12×10

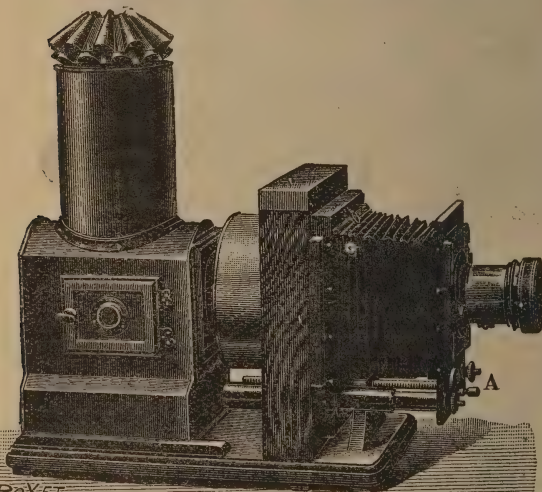
Price £6 8 0 (including R.R. Lens Iris Stops).

Extra carriers, $\frac{1}{8}$; special dark slide for reduction, **£1 4**.

Very Compact. Very Effective. Very Neat.

CANTILEVER No. 2 UNIVERSAL. . . .

An Elegant and Portable R.I. Body Enlarging Lantern.



Polished Walnut Stand and Stage with Metallic Corners.
Leather bellows (detachable) sliding front. Rapid focussing screw. Best rapid portrait lens with stops. Compound condensers of best white glass.

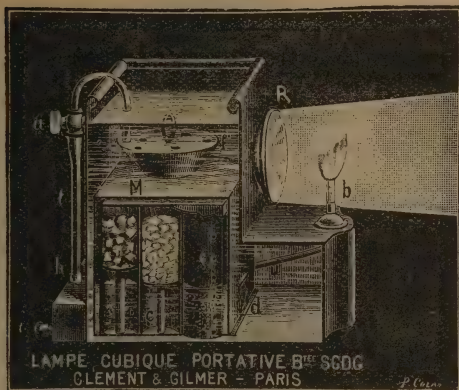
For Negatives ..	$4\frac{1}{2} \times 3\frac{1}{2}$	5×4	$6\frac{1}{2} \times 4\frac{1}{2}$ in.
Condenser ..	"	"	$8\frac{1}{4}$ in. diameter.
Lens ..	"	"	11 in. eq. focus.
With Duplex Oil Lamp	"	"	£10 16.
	"	"	£8.
	"	"	£6 18.

(Same prices with Gas Fittings for Auer Incandescent Burner,
35/- extra with Incandescent Spirit Lamp.)

FRANCE.

"THE CUBIQUE" Portable . .

(Patented) Safety Acetylene Lamp for Projection.



*Burns an hour
and a half without
interruption.*

**No danger.
No smell.**

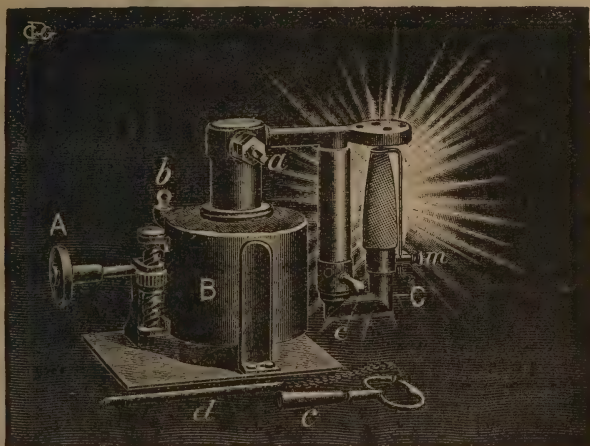
DIMENSIONS :
Height of lamp, 8 in.
Length of base, 8 $\frac{1}{2}$ in.
Width of base, 4 $\frac{1}{2}$ in.

This new lamp fits
into all lanterns and
gives a beautiful
white and steady
light.

Price - 25/-

Beware of the imita-
tion article in which
the carbide agglom-
erates, stopping the
production, and ex-
posing to mishaps!

NEW INCANDESCENT SPIRIT LAMP. (Patented)



Fits into all lanterns, burns **ordinary** Methylated Spirit, gives a Pure White and Steady Light during 2 hours with $\frac{1}{2}$ pint of spirit. A perfect substitute to paraffin lamps. Invaluable for enlargements. Price **£2** (C)

FRANCE.

ANIMATED PROJECTION AND PHOTOGRAPHY

BY

CLEMENT & GILMER'S
"VITAGRAPH"

(No. 6).

A new model for public exhibition. Made entirely of strong metal and polished brass. Best workmanship. Luminosity, Steadiness, no Flickering, new Shutter. Spools can take 150 to 200 feet of film. Movement is perfectly silent. Baseboard and front of best polished mahogany. Front lens with rack and pinion adjustment.

Price £6 (c).

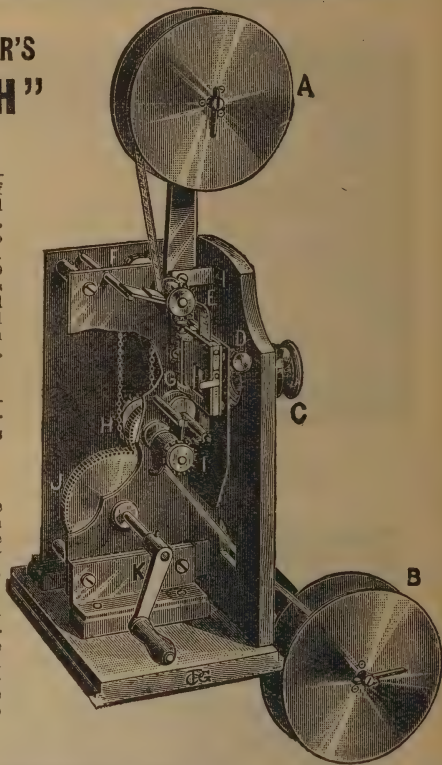
No. 6B is the same apparatus disposed for "photography," with an extra lens of R.R. combination.

Price £10 (c).

When ordering specify the size of picture required from a certain distance. We make our lenses currently to give a picture the $\frac{1}{2}$, $\frac{2}{3}$, $\frac{3}{4}$, or $\frac{1}{3}$ of the distance.

This Cinematograph combined with a lantern (with-out lamp) and a lens for the ordinary projections and mounted on a sliding mahogany base for the immediate succession of fixed to animated pictures.

£12 (c).

New Transportable Electric Light Generator
"SECURITAS."

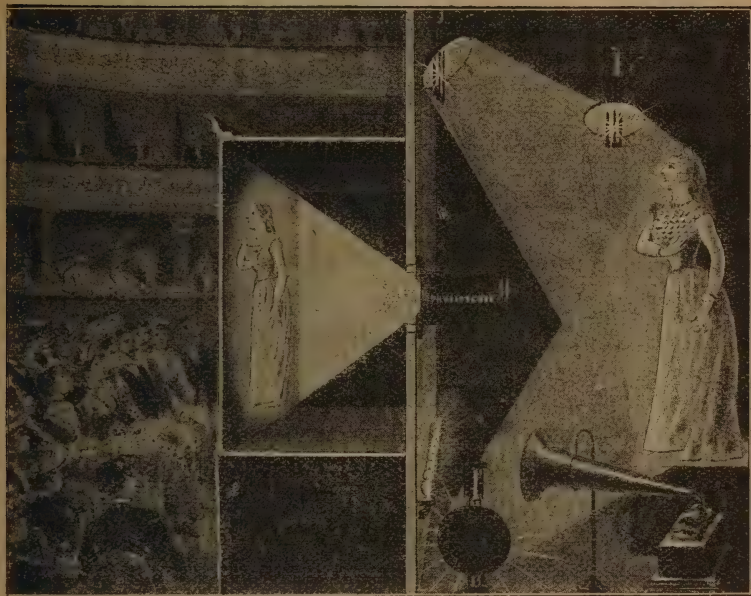
Packs in a strong wooden case mounted on wheels, with handles, and measuring $38 \times 24 \times 24$ inches. It weighs 600 lbs. complete. The Generator is mounted in a quarter of an hour, and furnishes the current immediately. Giving an intensity of 15 amperes 110 volts; burning two pints of essence of petroleum per hour. With three pints of essence the intensity equals 22 amperes.

Price of the complete material, with all accessories and measuring instruments, £100 (B).

[See preceding and following pages.]

THE "PHYSIOSCOPE."

The latest Novelty for Showmen.



A New Portable Instrument for projecting a well-lighted reduced image of a living subject on a transparent screen perfectly defined. This optical construction possesses the advantage of giving great depth, so that the movements of the subject do not affect the sharpness of the projected image. The artist can either sing, dance or mimic. In the latter case, the Phonograph can be used for talking or singing, which, combined with the noise produced by turning a ratchet wheel, will produce on the mind of the public the sensation of a speaking cinematograph. Usual distance between subject and image, 18 to 21 feet, which can be varied according to requirements. The screen should be of ground glass, lightly vasilined.

Price of Physioscope alone	...	...	...	£20	0	0
" *Edison Concert Phonograph for large records				16	0	0
" *Plain Cylinders, large size	...	...	...	0	2	6

*These prices do not include the electric arc lamps or the screen which can be obtained in any large centre,

[See preceding pages.]


AMERICA.

GOLD MEDAL from the Paris Exposition, 1900, and Gold Medal from the Pan - American Exposition, Buffalo, 1901, awarded to the

LEVY SCREEN

indicate clearly that this maker does not relax in his efforts to maintain the highest possible standards of perfection.

The screen for **half-tone** should be primarily a perfect appliance, and our efforts have been, and are, steadily directed toward making it so, regardless of other considerations.

MAX LEVY, 

Wayne Avenue & Berkley St.
Wayne Junction, Pa., U.S.A.

Foreign Selling Agents:

England: PENROSE & CO., 109, Farringdon Road, London, E.C.

France: J. VOIRIN, 15, Rue Mayet, Paris.

Germany and Austria: F. HEMSATH, Roderbergweg 135, Frankfort a/M.

New South Wales: HARRINGTON & CO., Sydney.

Japan: R. KONISHI, Tokio.

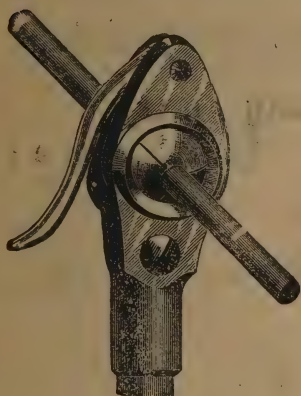
South America: H. STEIN, Buenos Ayres,

AMERICA.

OTIS C. WHITE,

WORCESTER, MASS., U.S.A.

**STANDARD APPLIANCES FOR POSING
AND LIGHTING IN THE STUDIO.**



SPECIAL ATTENTION
given to Export Trade.

WHITE'S HEAD SCREENS.

THREE STYLES. An absolute necessity in any Studio. Thousands in use.

"THE WHITE" POSING CHAIR AND ATTACHMENTS.

Adjustable to all requirements. A dozen chairs in one.

WHITE'S IMPROVED POSING SUPPORTS.

Two styles. Wonderful adjustability.

WHITE'S PHOTOGRAPHIC CHILD'S CHAIR.

For posing of infants among scenery and draperies.

WHITE'S POSING HEAD REST.

For direct attachment to any chair.

Our goods are rated as the Standard Studio Appliances. They are of the highest grade, and unequalled in efficiency and durability. For sale by leading stock houses, or direct from our factory.

**Send for Catalogue for full information and
Price Lists.**

Cable Address: "ADJUSTABLE."



THE most Practical of all
Developing Papers.
Not affected by Climatic Conditions.
May be printed at any Time,
By any Light.
Six different Grades.
Adapted for Every Negative.

*Prices and Samples
on application to . .*

THE
ANTHONY & SCOVILL CO.
122-124, FIFTH AVE. ATLAS BLOCK,
NEW YORK, CHICAGO,
U.S.A.

THE
ANTHONY & SCOVILL CO.

MANUFACTURERS of all Photo-
graphic Requisites. Everything
for the Amateur and Professional.

Cameras for every purpose.

Papers.

Plates.

Films.

Lenses.

Shutters.

Chemicals.

*Send for our List of
Photographic Publications.*

THE
ANTHONY & SCOVILL CO.

NEW YORK,

CHICAGO,

U.S.A.

Wholesale Dealers in Photographic Materials.

SPECIALITIES—ANCHOR MATT PAPER (in sheets and cut size).



Sole Agents for BERNHOEFT'S Light-
ing Apparatus "SANS SOUCI."

Backgrounds and Accessories.

Printing Frames, Dishes, Glass Mea-
sures, Roller Squeegees, &c.



For Professional
and Amateur
Photographers.

Bender & Co.,

10, BERNERS STREET,

OXFORD STREET, LONDON, W.

Works :—242, London Road, Croydon.

Enlargements in all Processes.



Miniatures on Ivory.

Oil Paintings by Eminent Artists.

THE ACTIEN GESELLSCHAFT
FUR
ANILIN FABRIKATION,
BERLIN.

PHOTOGRAPHIC DEPT.

SOLE AGENTS:

Chas. Zimmermann & Co.,
9 & 10, ST. MARY-AT-HILL, LONDON, E.C.

MANUFACTURERS OF

RODINAL
EIKONOGEN
IMOGEN SULPHITE
AMIDOL
METOL
ORTOL
GLYCIN
DIPHENAL
DIODEN



TRADE MARK.

PARAMIDOPHENOL
A.G.F.A. INTENSIFIER
A.G.F.A. REDUCER
A.G.F.A. VARNISH
A.G.F.A. FIXING SALTS
A.G.F.A. NEUTRAL TONING AND FIXING SALTS
A.G.F.A. DEVELOPING CARTRIDGES

ISOLAR **ANTI - HALATION** **PLATES.**

PURE PHOTOGRAPHIC CHEMICALS.

For further particulars see Agfa Booklet, free of all dealers.

E4

The Actien
für Anilin

PHOTO



Gesellschaft
Fabrikation.

DEPT.

RODINAL

(Patented.)

A HIGHLY concentrated developing solution, which for use is to be diluted with 15 to 30 parts of water.

Every make of dry plate, film bromide paper, or lanternslide on the market can be developed to advantage with RODINAL, it being obvious that different makes require slightly different manipulation to produce equally good results.

When diluted in the proportion of 1 in 10 parts of water, development is rapid and productive of strong contrasts; when further diluted, say 1 part in 30 or 40 of water, development is slower and softer results are obtained.

Over-exposures developed with 1 in 25 give a thin negative, but one full of detail; or, developed with 1 in 20 with an ample allowance of pot. bromide, give a negative full of fine detail but rich in harmonious contrasts.

Under-exposures require a weaker solution, say 1 in 30 to 40 parts of water.

With correct exposures, the results are controlled entirely by means of dilution, and any style of negative may be obtained in this simple manner.

For bromide papers, RODINAL is excellent, producing rich velvety blacks, without any possibility of stain.

PRICES: 3 oz. Bottle, 1/6; 8 oz. Bottle, 3/-; 16 oz. Bottle, 5/-.

IMOGEN SULPHITE.

THIS, the latest addition to our list of developers, lays claim to consideration as much for reasons of efficiency and economy as for the great simplicity of the modes of preparation, of use, and control of development.

It develops clearly and brilliantly, with very fair rapidity and with ample power for detail and density. It does not stain, fog, nor affect the fingers; and, as will be seen from the appended directions, there is no developer so amenable to control, nor so easy to prepare. Two solutions are required, as follows:—

A.—Imogen Sulphite 1 oz. | Dissolved in Water 12 oz.

B.—A cold saturated solution of Household Soda (Soda Carb.)

For correct exposures:—Take A, 2 parts; B, 1 part.

For under exposures:—Take A, 2 parts; B, 1 part; Water, 2 parts.

For over exposures:—Take A, 2 parts; B, 1 part; Pot. Bromide, 10 per cent. solution. 5-50 drops per oz.

Equal parts of A and B give heavy, dense negatives; and, by varying the different quantities of the two solutions, and adding more or less water, an endless variety of styles of negative may be produced at will.

PRICES: 1 oz., -/7; 4 oz., 1/8; 8 oz., 3/-; 16 oz., 5/4.

EIKONOGEN.

(Patented.)

THIS is an old-established and favourite developer, suitable to all methods of working, producing negatives of a peculiarly soft and artistic nature, full of the finest detail with a long scale of gradations up to full density. It preserves these powers and characteristics even under forced developments, which indicates its employment for the production of snapshot, flash-light, and portrait negatives; giving neither marked contrasts nor their unprintable shadow details.

EIKONOGEN keeps well both dry and in solution, and although it has been on the market for some years a constantly increasing sale, in spite of other introductions, proves its value as a developing medium.

PRICES: 1 oz., 1/2; 4 oz., 3/6; 8 oz., 6/6; 16 oz., 12/-

And in Cartridges producing ready for use solution, per box of 10, 2/6.

SOLE AGENTS FOR GREAT BRITAIN.

CHAS. ZIMMERMANN & CO., LONDON.
9 & 10, St. Mary-at-Hill.

For further particulars see Agfa Booklet, free of all dealers.

The Actien
für Anilin
PHOTO



Gesellschaft
Fabrikation.
DEPT.

Diogen.

(Patented.)

Diogen is one of the most elastic of the developers, its great latitude permitting the correction, during development, of the effects of considerable over-exposure, as well as of gross under-exposure. It produces a negative similar to that given by Glycin, combined with all the detail obtained with Rodinal, the image being of a good black colour with full gradation.

Diogen is particularly handy to use, since it suffices to prepare a single concentrated solution, and to dilute this with water according to the exposure of the plates.

Prices, 1 oz. ... 1s. 6d. | 4 oz. ... 5s. 6d. | 16 oz. ... 20s.

Metol.

(Patented.)

Our Metol is supplied in a crystalline white powder form, and is used in conjunction with carbonic alkalies.

Metol is a quick and powerful developer, bringing out all detail possible, and gradually building up the density in well-balanced gradations.

Metol permits of shorter exposures than the other developers, but it should be remembered, while developing, that the negative loses density in the fixing-bath.

The image in detail rushes up with extraordinary rapidity. This does not necessarily indicate over-exposure; the result must be judged entirely by transmitted light.

Prices, 1 oz. ... 2s. 6d. | 4 oz. ... 9s. 6d. | 8 oz. ... 19s. | 16 oz. ... 38s.

Amidol.

(Patented.)

A.G.F.A. Amidol is a fine white crystalline powder.

Amidol is a quick and powerful developer, bringing out all details and giving good density. The chief characteristic of this developer is its power in conjunction with Sodium Sulphite without the addition of other alkalies.

The bad effects of a strong alkali, such as Potassium Carbonate or Caustic Potash, whether it be on the operator's hands or on the delicate sensitive material, is therefore avoided.

Amidol ranks in a premier position for developing Bromide Paper, giving excellent gradations and the deep blue-black deposit so much sought after, without stain.

Many people have an idea that Amidol is only useful for Bromide work. This is quite erroneous, and they will be surprised and delighted when trying it on plates for the first time—surprised at the power and control obtainable, and delighted with the printing quality of the negative. It can be highly recommended for quick shutter work, &c.

1 oz. ... 2s. | 4 oz. ... 7s. 6d. | 8 oz. ... 15s. | 1 lb. ... 30s.

SOLE AGENTS FOR GREAT BRITAIN.

CHAS. ZIMMERMANN & CO., LONDON.

9 & 10, St. Mary-at-Hill.

For further particulars see Agfa Booklet, free of all dealers.

The Actien
für Anilin
PHOTO



Gesellschaft
Fabrikation.
DEPT.

Paramidophenol.

(PATENTED.)

Paramidophenol (hydrochloride) is the basis of Rodinal; it can be supplied in powder or crystals (needles), the powder being considered the more durable, and in which form it is invariably supplied.

Paramidophenol develops slowly and clearly with carbonic alkalies, but with caustic alkalies it develops quickly and gives great density.

Temperature has little effect on the power of this energetic reagent, and also there is an almost complete absence of fogging propensities.

1 oz., 2/-. 4 oz., 7/6. 16 oz., 30/-.

Glycin.

Glycin has the characteristic of giving particularly "clean" negatives, and is for this reason a very popular developer for black and white work, being used extensively by makers of half-tone and other reproduction blocks.

It gives good density with a beautiful transparency in the shadows, without loss of detail and without any possibility of stain, with a very fine grained image, for which reason it is indicated for the development of photo-micrographic negatives.

It is because of these advantages peculiarly suitable to the "stand development" system.

It is not so rapid as most of the developers described in this book, but is very adaptable to uncertain and variable exposures.

1 oz., 2/-. 4 oz., 7/6. 8 oz., 15/-. 16 oz., 30/-.

Ortol.

(PATENTED.)

A quick and powerful developer, giving negatives closely resembling those produced by Pyro; but as the deposit, is of a more actinic nature development needs to be carried rather further than is apparently sufficient to obtain a clean printing negative.

Ortol produces excellent gradations and ample density; it may be used over and over again, and apparently does not lose its power as soon as some other developers. It is also supplied in cartridges and glass tubes.

1 oz., 2/6. 4 oz., 9/6. 8 oz., 19/-. 16 oz., 38/-.

SOLE AGENTS FOR GREAT BRITAIN.
CHAS. ZIMMERMANN & CO., LONDON.
9 & 10, St. Mary-at-Hill.

For further particulars see Agfa Booklet, free of all dealers.

The Action
für Anilin

PHOTO



Gesellschaft
Fabrikation.

DEPT.

DEVELOPING AND OTHER CARTRIDGES.

The following advantages are obtained by using the AGFA (late Andresen) Cartridges. With above trade mark :—

The Cartridges are specially prepared by experts, and each one contains the **exact** quantity of necessary salts.

They are made by the manufacturers of the developers, and naturally perfectly fresh re-agents are used, and therefore keep longer than other makes.

They produce more solution and one which will keep in good condition longer, and that can be used over and over again.

The contents of a cartridge on being dissolved in water give a solution ready for immediate use.

They are extremely useful and handy for tourists and travellers, and also for those who have not space or desire to keep a large variety of chemicals.

The following Cartridges are issued under our Trade Mark :—

AMIDOL—

Per box of 6 2s. 6d.

HYDROKINONE—

Per box of 10 4s. 0d.

ORTOL—

Per box of 6 3s. 0d.

AGFA REDUCER—

Per box of 10 2s. 3d.

EIKONOGEN—

Per box of 10 2s. 6d.

METOL—

Per box of 6 3s. 0d.

PYRO SODA—

Per box of 5 2s. 2d.

ACID FIXING SALTS—

Per box of 10 (8 oz. each) 1s. 9d.

Per box of 10 (40 oz. each) 5s. 0d.

TONING AND FIXING SALTS—

No. I.—Per box of 10 (for 4 oz. each) 3s. 9d.

No. II.—Per box of 10 (for 10 oz. each) 9s. 0d.

DEVELOPERS IN TABLET FORM.

The following developers are supplied in this very well-known form, and are recommended for their keeping properties, as each Tablet contains a given amount of developer and requires one Alkali Tablet to make a normal developer. It remains a simple operation to vary the developer at will, a thing that is impossible when using cartridges. For convenience the Tablets are in tubes of 10, 10 of which are in a box with 10 Alkali tubes :—

EIKONOGEN

AMIDOL

METOL

HYDROKINONE

PYRO

Per box of 10 tubes, each 10 Tablets of Developer, and 10 tubes, each 10 Tablets of Alkali.

EACH TABLET MAKES $\frac{3}{4}$ oz. OF SOLUTION.

SOLE AGENTS FOR GREAT BRITAIN.

CHAS. ZIMMERMANN & CO., LONDON.

9 & 10, St. Mary-at-Hill.

For further particulars see Agfa Booklet, free of all dealers.

The Actien
für Anilin

PHOTO



Gesellschaft
Fabrikation.

DEPT.

THE AGFA INTENSIFIER.

This is a concentrated solution of the necessary mercurial salts to produce intensification in one manipulation.

AGFA INTENSIFIER does not stain, but gradually builds up the image by the deposition of mercury, giving a permanent intensification greater than that obtainable with mercuric chloride.

To use, 1 part of the solution is diluted with 9 parts of water, and the negative to be intensified immersed. Intensification commences at once, and proceeds regularly and slowly for about 10 to 15 minutes, when maximum intensification is reached. The plate is then washed and dried, and the process is complete.

PRICES.

2 oz., 1/- 4 oz., 1/9 8 oz., 3/- 16 oz., 5/-

AGFA NEGATIVE VARNISH.

A varnish which can be applied to the cold negative, and which dries in five to six minutes.

The coating, which is extremely thin, owing to the fluidity of the varnish, dries hard, damp-proof and colourless, and with sufficient "tooth" to permit of retouching without the use of any further medium. The varnish may also be applied locally with a brush.

AGFA NEGATIVE VARNISH is very economical in use owing to the very small quantity that remains on the plate. It does not affect the duration of printing, and combines the offices of protective, damp-proof, and retouching varnishes.

PRICES.

4 oz., 1/6 8 oz., 2/6 16 oz., 4/6

THE AGFA REDUCER.

A useful and novel preparation, which merely requires dissolving in water to be ready for immediate use.

It is issued in powder form in a neat and handy bottle, the stopper of which forms a convenient measure. This measure, brim-full, will hold sufficient of the salts for making up 2 ozs. of Reducing Solution.

The negative or positive that requires reduction is immersed in this solution and reduction takes place regularly and at a fair pace, but not too quickly to prevent the action being stopped when sufficient reduction has taken place. The plate is then well washed, and the whole process is finished.

It can be used for Bromide Paper as well, but it is desirable to add twice the amount of water.

PRICES.

4 oz. bottle, with patent measure stopper 1/9
Or, 10 cartridges, each sufficient for 3½ oz. solution 2/3

SOLE AGENTS FOR GREAT BRITAIN.

CHAS. ZIMMERMANN & CO., LONDON.
9 & 10, St. Mary-at-Hill.

For further particulars see Agfa Booklet, free of all dealers.

The Actien
für Anilin

PHOTO



Gesellschaft
Fabrikation.

DEPT.

A.G.F.A.

Neutral Toning & Fixing Salts (GOLD BATH).

This is quite an innovation in the way of combined baths, obviating the dangers of this manner of toning. These dangers—double toning, sulphur toning, and undue reduction of the printed-out image—are due to the acidity of the bath. This acidity becomes impossible with our neutral bath.

Another danger is that of completion of toning before fixation. This does not occur with the A.G.f.a. Salts, as toning does not commence until five or six minutes after the print has been immersed in the bath, the consequence being that the print is fully fixed out before toning is complete.

When exhausted the bath ceases to tone. It will thus be seen that the preparation and use of the bath is absolute simplicity, while economy and the permanence of finished pictures are not unconsidered. It is suitable for collodio-chloride, gelatino-chloride, and albumenised papers, and post-cards.

PRICE, in 6 oz. Tins, 1/- Making 30 ozs. solution.

Acid Fixing-Salts.

These salts are in a concentrated dry form, and, on being dissolved in water, produce an acid fixing-bath without any further admixture.

The solution has the following advantages over the ordinary Hypo solution :

1. It always remains clean and clear.
2. A negative fixed in it remains a clear colour, and yellow stain is removed.
3. The negative film is somewhat hardened—a very useful effect in warm weather.
4. Development is promptly stopped. Insufficient rinsing between development and fixing is no disadvantage.
5. This fixing salt is twice as powerful as the ordinary Hypo, 1 part of salt being equal to the work done by 2 parts of Hypo. 1 part is dissolved in 8 times its weight of water.

It is put up in two styles of packing :—

CARTRIDGES IN BOXES.

No. I. 10 Cartridges, each giving 8 ozs. solution .. 1/9 box.

No. II. 10 Cartridges, each giving 40 ozs. solution .. 5/- box.

PACKETS.

4 ozs., 3d. 8 ozs., 5d. 16 ozs., 9d.

(To be dissolved in 8 times their weight of water.)

Toning & Fixing-Salts

IN CARTRIDGE FORM.

Each cartridge giving, on being dissolved in plain water, a combined toning and fixing Gold-Bath ready for immediate use, suitable for any paper.

No. I. 10 Cartridges, each giving 4 ozs. solution .. 3/9 box.

No. II. 10 Cartridges, each giving 10 ozs. solution .. 9/- box.

SOLE AGENTS FOR GREAT BRITAIN.

CHAS. ZIMMERMANN & CO., LONDON.

9 & 10, St. Mary-at-Hill.

For further particulars see Anfa Booklet, free of all dealers.

The Actien
für Anilin

PHOTO



Gesellschaft
Fabrikation.

DEPT.

ISOLAR (ANTI-HALATION) PLATES.

Between the sensitive film and the support, a layer of non-actinic matter has been added, which renders it impossible for light to reach the glass and be reflected by it; further, the emulsion itself is stained a peculiar yellow, by which reflection in the film itself is avoided, thus rendering a more critical definition by avoidance of the spreading action of light. These stains are automatically discharged during development and fixing, provided an alkaline developer and an acid fixing bath are used.

The sensitiveness of the plate is high, giving ample speed for snapshots, etc.

The Orthochromatic is the same speed as the Ordinary when used without a screen. This plate is sensitive to the Violet, Blue, Green, and Yellow Rays.

The advantages of an absolutely halation-free plate, such as this, are well known, and it is unnecessary to recapitulate them here. But the freedom from dust and dirt incurred by backing should be noted.

PRICES OF ISOLAR PLATES.

Stocked in London in following sizes :

				Ordinary.	Orthochromatic.
3 $\frac{1}{4}$	\times	4 $\frac{1}{4}$	...	1/11	2/2
5	\times	4	...	2/9	3/1
6 $\frac{1}{2}$	\times	4 $\frac{3}{4}$	...	3/6	3/9
8 $\frac{1}{2}$	\times	6 $\frac{1}{2}$	...	7/3	7/10
*10	\times	8	...	11/6	12/6
*12	\times	10	...	16/-	17/7

**Also packed in half dozens.*

Also in Cut Films and Positive Plates.

Full List on Application.

A.G.F.A. ROLL FILMS.

Highly Sensitive.

Inactive Wrapping Paper.

No Glycerine Bath necessary.

Do not roll up when dry.

Coated on clear Celluloid.

In all sizes for Film Cameras and Roll-holders.

Packed in Tin Boxes.

SOLE AGENTS FOR GREAT BRITAIN.

CHAS. ZIMMERMANN & CO., LONDON.

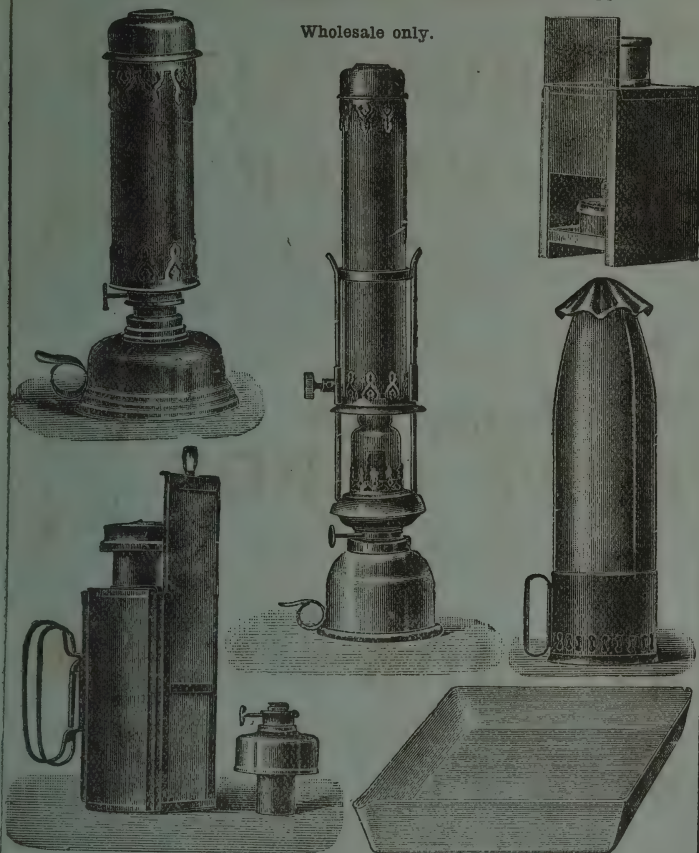
9 & 10, St. Mary-at-Hill.

For further particulars see Agfa Booklet, free of all dealers.

C. F. KINDERMANN & CO., Berlin,

MANUFACTURERS OF
LAMPS. CAMERAS. ACCESSORIES.

Wholesale only.



Sole Agents—

CHAS. ZIMMERMANN & CO.,

9 and 10, ST. MARY-AT-HILL, LONDON, E.C.

Vereinigte Fabriken Photographischer Papiere DRESDEN.

MANUFACTURERS OF

ALBUMENIZED PAPER



(Crossed Swords Brand)



MADE ON FINEST RIVES PAPER.

MAUVE OR PINK, IN VARIOUS SHADES.

Weight 8, 10, or 12 Kilos per Ream.

SINGLE ALBUMENIZED, DOUBLE BRILLIANT, AND DOUBLE ENAMEL.

Collodio Chloride

PRINT OUT POST CARDS

"Crossed Swords."

(MATT or GLOSSY).

12 in Packet with two masks.

Charming Souvenirs. Easy to work.



Trade Mark

ALSO OF

KOSMOS P.O.P.

(Collodio Chloride)

✱ ✱ ✱
WHITE, MAUVE, OR PINK.
GLOSSY OR MATT.

One of the finest P.O.P. extant, it has won for itself a premier position by reason of the exquisite tones and effects obtainable, producing the finest details of the negative without clogging in the shadows.

✱ ✱ ✱

IN SHEETS OR CUT SIZES.

SOLE AGENTS—

CHAS. ZIMMERMANN & Co.
9 and 10, St. Mary-at-Hill, LONDON, E.C.

THE
**VEREINIGTE FABRIKEN PHOTOGRAPHISCHER
 PAPIERE, DRESDEN.**



**Crossed Swords
 platino matt p.o.p.**

A NEW HIGH-GRADE PRINTING-OUT PAPER FOR AMATEURS.

Producing a great variety of tones from Carbon Red to Platinum Black.

EASY TO MANIPULATE. ARTISTIC RESULTS. QUICK PRINTING.

Black Platin tones produced in a single combined toning and fixing bath. Does not require over-printing, thus avoiding bronzed shadows. Does not give flat prints from soft negatives, nor smother detail in the shadows. Coated on thick paper.

In 1s. Packets. Of all Dealers.

Special Platinum Combined Bath, as above, 4d., 6d., and 1s. per Bottle.

PRESS OPINIONS.

The Photogram:—"We can strongly recommend this brand of paper to those who desire warm or cold tones at will on a paper which requires no departure from the usual methods of P.O.P."

The Photographic News:—"This is a high-grade paper coated on an extra stout base and capable of being toned to many colours according to the bath and agent used. To obtain platinum black tones with combined toning and fixing bath: this can only be done with the bath specially sold for the purpose . . . We have been most successful in getting a beautiful platinum black tone."

Photography:—"It prints quickly and tones well. A novelty in toning baths is issued for use with this paper. It is a combined toning and fixing bath, with which some very beautiful colours can be obtained."

The British Journal of Photography:—"We have ourselves made practical trial of the paper and succeeded in obtaining rich black images by the aid of the special bath referred to. Physically the behaviour of the surface is all that could be desired; the paper appears exceedingly simple to work, and the command over the colour of the image seems to be wide and certain."

The Amateur Photographer:—"It is something that the average photographer has been looking for, and, until recently, has looked for in vain. The paper is a collodio-chloride printing-out paper of the highest grade, coated on a particularly stout base, the resultant print resembling a good carbon so closely that the difference is exceedingly difficult to distinguish. . . . We have obtained engraving black, red chalk, purple, violet, olive green, and a charming dark brown, and all in one batch of prints. . . . All the operations are very simple. . . . A trial will convince the most apathetic photographer that he has a new power in his hands with this really excellent paper."

Showcards and Particulars on Application.

DEALERS ONLY. LIBERAL DISCOUNT.

SOLE AGENTS:

CHAS. ZIMMERMANN & Co.,
9 & 10, ST. MARY-AT-HILL, LONDON, E.C.

CHAS. ZIMMERMANN & CO.,
9 & 10, ST. MARY-AT-HILL,
LONDON, E.C.

Telephone :
109 AVENUE.

Telegrams :
POISONABLE, LONDON.

PURE
PHOTOGRAPHIC CHEMICALS,
DEVELOPERS, PAPERS,
CAMERAS, GELATINE
ACCESSORIES, LAMPS, &c.

Sole Agents for—

The Actien Gesellschaft für Anilin Fabrikation,
BERLIN.

The Vereinigte Fabriken Photographischer Papiere,
DRESDEN.

The Deutsche Gelatine Fabriken,
HOECHST.

C. F. Kindermann & Co.,
BERLIN.

Export Orders a Speciality.

WHOLESALE ONLY.

CHAS. ZIMMERMANN & CO.
9 & 10, ST. MARY-AT-HILL, LONDON, E.C.

TURNER'S AND VALISES

Recommended by the C.T.C.
and the leading Photographic
Papers and Journals.

Used by the Post Office, the C.I.V. in the South African War, and the Cycling Sections of the leading Volunteer Battalions throughout the country. **Fitted to the New Army Cycles.**
Special Carriers for heavy Photographic Outfits for Motors, &c.



CARRIERS FOR CAMERAS.

Adopted by the leading
Photographic
Firms.

When ordering say if for Round, D, Oval, or 8-shaped stays.



"TURNER'S" PING PONG



CARRIER.

Fitted with Tubular
Jointed Clips. Instant-
aneous attachment.
Specially adapted for
Kodaks.

SIZE	PRICE	Clips Leather-lined, to prevent damage to enamel.
10x4...	6/6	
14x4...	7/6	
10x7...	8/-	
12x5...	8/-	
10x8...	8/6	Fitted with Finger Nuts. No Tools required.
14x6...	8/6	
14x7...	9/-	
14x8...	9/-	
19x6...	10/-	
19x8...	10/6	All Carriers fitted with Straps.
10x3...	6/6	

Size of Bottom of Camera Case should be given.

3/6
Light
or
Strong
Clips.

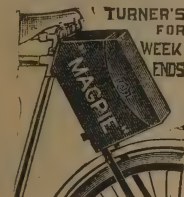


Front Wheel Carrier.
Size 8x5. Price 9/-

TELESCOPIC,
For Cameras or Luggage.

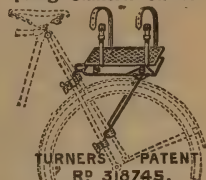


Stock size closed, 12x7x5.
Waterproof Canvas, 10/-
Waterproof Tweed, 15/6
Hide or Enamelled Seal, 21/-



Waterproof Canvas, 7/6
Solid Hide, 12/6.

Spring Camera Carrier.



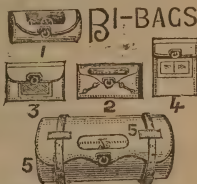
TURNER'S PATENT
RP 318745.

Any size not exceeding
14x6. Price 11/-
Vibration intercepted.
State full weight of Camera.

Micro Carrier.



Suitable for Light Folding
Cameras. Price 3/-



No Rattle. No Straps.
Price 3/- to 10/-

Bags, Cases, &c., to order. Any Size or Design.
TURNER'S CARRIERS are a necessity to the Cycling Photographer. INSIST ON having the ORIGINAL.

FULL LIST of Photographic and Cycling Specialities POST FREE.

H. G. TURNER, Eldon Grove, Manchester.

TERMS, SHOW CARDS, &c., ON RECEIPT OF TRADE CARD.

I BUY TROUBLE



in the way of goods that are in the way, Job Stocks, Superseded Lines, **STUDIO** Apparatus no longer required, Furniture, Accessories, Cameras, Lenses, &c. Anything in the photographic way, Studios cleared entirely, from Mammoth Accessories and Backgrounds to the Spotting Brush.

NEW GOODS SUPPLIED IN EXCHANGE.

Some people whose old stock I have bought:—

SOLOMAN & Co.,
ARTHUR WESTON,
EUROPEAN BLAIR CAMERA Co.,
SHEW & Co.,
R. T. ADAMS & Co.,
EASTMAN & Co.,
KODAKS,
NEGRETTI & ZAMBRA.

CHIPPER, The Exchangeries,
39, HIGHGATE HILL, LONDON, N.

ESTABLISHED HERE 1883.

"IT PAYS."

fourteen years this magazine has been recognised as the leading photographic magazine of America. Edited by Dr. JOHN NICOL and F. C. BEACH, both veterans in photography, its articles and teachings are valuable and authoritative; the monthly illustrations, picture criticisms, reports on new apparatus and inventions is a unique feature.

The cost is less than half a cent. per day—\$1.50 per year in the United States and Canada; \$2 per year to other countries. Try a year's subscription for 1903.

Return this Coupon with your Order and receive an Exposure Meter FREE.

AMERICAN AMATEUR PHOTOGRAPHER, 359, Broadway,
New York City, U.S.A.

'Ross' Portrait & View Lenses.

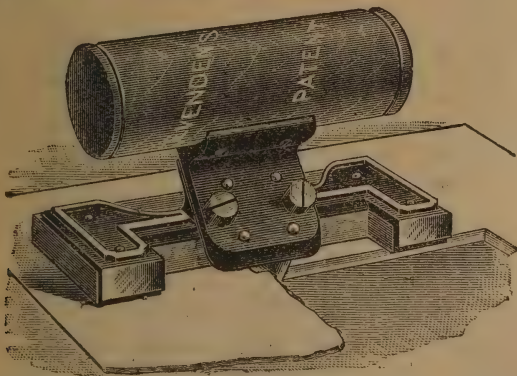
These Lenses are used by Photographers all over the world. Recent years have witnessed many notable improvements, and full details of these will be found in the New Price List just issued.

THE BEST IS THE CHEAPEST IN THE END.

R. F. SMITH,

104, St. Francis Xavier Street, MONTREAL

EVENDEN'S PATENT MOUNT CUTTER.



MOUNT CUTTING MADE EASY: NO SKILL REQUIRED.

PRICE 7s. 6d. each. Postage 3d. Foreign Postage 1lb weight.

To be obtained of all Principal Photographic Dealers and
GEO. EVENDEN, 58, RUGBY ROAD, BRIGHTON.

The Oldest and Most Influential Photographic Journal in the World.

British Journal of Photography

Telegraphic Address: "
"Photometer, London."

ESTABLISHED 1854.

Telephone: [No. 2722 Gerrard.

[Published every Friday. Price 2d.]

SUBSCRIPTION, POST FREE:

One Year -	-	-	-	-	10/10	} United Kingdom and the Channel Isles.
Half Year	-	-	-	-	5/5	
Quarter Year	-	-	-	-	2/9	
Places Abroad, 13/- One Year.						

London:

HENRY GREENWOOD & CO., PUBLISHERS, 24, WELLINGTON STREET. STRAND, W.C.

BETTER THAN CARBONS.

Smith's Patent Bromides.

Any shade of Dark Brown, Sepia, and Purple Brown. Are quite permanent. All who try them say they are very pleased with them.

SMITH & SONS, 3, Henry Rd., NEW BARNET.

BURR'S LENSES.

*Used by many of the Best Photographers for
more than forty years.*

CHARLES BURR,
138, WAKEFIELD STREET, EAST HAM, LONDON.



THE
"KORESCO"
CAMERA

FOR

ENLARGING,
 REDUCING,
 COPYING.

ENGLISH . MADE . THROUGHOUT.

"Undoubtedly the best Daylight Enlarger on the market."

$\frac{1}{4}$ PLATE SIZE COMPLETE **35/-**

5 x 12 SIZE " **80/-**

SEND FOR ALL PARTICULARS (SENT POST FREE)
TO THE SOLE MAKER:

WM MIDDLEMISS,
BRADFORD, YORKSHIRE, ENGLAND.

THE "CAMSTAND."

(PATENTED.)

INDISPENSABLE FOR DULL WEATHER,
PANORAMIC PHOTOGRAPHY, &c.
TIME EXPOSURES WITHOUT TRIPOD.

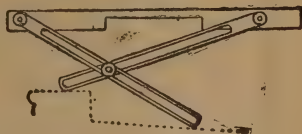
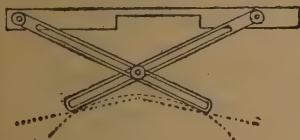
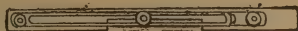


Adjustable to any uneven surface, at any angle.

BACK OF CHAIR,	TRUNK OF TREE,
IRON RAIL,	WINDOW SILL,
ROUND PARAPET,	UNEVEN ROCK,
	ARRIS OF FENCE,
	&c.

Prevents Scratching the Camera bottom.

CLOSED



See "Photography,"

Nov., 1901, & June, 1902 :

} "Likely to come in for pretty extensive use."

Mr. — writes,

August, 1902 :

"An appliance as portable as your Camstand is a boon indeed to the hand camera worker."

Mr. — writes,

September, 1902 :

"Levelling it in a few seconds on back of a chair in the Cathedral, I gave 1 hour's exposure without attracting notice."

Price, Polished Mahogany, Lacquered Brass, 4/6. Post, 3d.

WHOLESALE AND RETAIL OF

CAMSTAND CO.,

16, WARWICK STREET, REGENT ST., W.

The Altrincham Rubber Company's
NEW MODEL 1903 PATTERN
SANDERSON SHUTTER
.. SUPERSEDES ..

ALL OTHER KNOWN MAKES,
Patented in the UNITED KINGDOM, the UNITED STATES,
GERMANY and FRANCE.

Every portion of the Shutter is thought out most carefully, and the experience of many years expended upon it.

It is made out of a solid mahogany block by special machinery. There are no joints glued together, in fact there is no glue used in its manufacture, so that it cannot be affected by climatic changes.

It is absolutely reliable.

It is simple to manipulate.

It has no complicated parts to get out of order. It works without vibration.

It is small, neat, and light in weight. It is beautifully French polished.

The Speeds are distinctly and indelibly printed on an ivory disc, and are seen at a glance.

The Speed Indicator does not project. All projections are on one side of the shutter only.

BESIDES THESE GOOD POINTS

the price brings it within the reach of all users of photographic apparatus and makers of cameras.

SIZES ... 1½ in. 1¾ in. 2 in. 2½ in. diameter.

PRICES: ... 10/6 11/6 12/6 15/-

Including Speed Indicator, and Anti-Climatic Ball and Tube.

SNAPSHOT PATTERN for Instantaneous Work—

7/- 7/6 8/- 9/-

When ordering please send a strip of paper that just meets round the Hood or Tube of the Lens upon which the Shutter is to fit, and you will then receive one which will be a **PERFECT FIT**.

If you buy this Shutter you will always use it. It will never fail you at a critical moment and cause disappointment. Your orders shall have our best attention.

The **ALTRINCHAM RUBBER COMPANY,** *Photographic .*
.. Specialists.
A. W. S. SANDERSON, Proprietor.

Crafton Street and Mossburn Buildings, ALTRINCHAM.

ALSO AT . . .

ENGLAND.

Brussels, Christiania, Stockholm, Paris, St. Petersburg & Madrid.

Telegraphic Address :—"RUBBER, ALTRINCHAM." Telephone No. 184.

[See next page.]

IMPORTANT TO ALL PHOTOGRAPHERS.**The Anti-Climatic
PNEUMATIC SHUTTER RELEASE.**

INTRODUCED by us to meet the requirements of Photographers everywhere, in all quarters of the Globe.

It is made of a Special Quality Red Rubber, which has for many years been in use for various purposes in **some of the most trying climates of the World.**

Much dissatisfaction has for a long time existed with regard to the Rubber of which Balls and Tubes have hitherto been made. Coated Rubber, Rubber Mixture, Rubberine, and similar preparations have all proved unsatisfactory, hence it is with considerable satisfaction we announce that, after prolonged and very costly experiments, not only has a satisfactory article resulted, but one that, notwithstanding the many advances in the price of Rubber in late years, is less costly than other similar productions.

PRICE LIST.

Complete Release (Standard Pattern), consisting of No. 0 Ball, 2 feet of Tubing and Teat joined together by means of a Special Screw Connection **1s. 3d.**

The Ball may be unscrewed at will and screwed up again, when an air-tight joint is secured.

Complete Release, as above, but Enamelled Black **1s. 6d.**

" " " " Red **1s. 6d.**

" " " " Arabesque (variegated Red and Black; not Anti-Climatic quality) **1s. 9d.**

Oval Release, consisting of Ball and 2 feet Tubing, for Iris Shutters ... **1s. 0d.**

Professional Release, consisting of large Ball, Black Hard Rubber Tap, 3 feet Special Stout Tubing, suitable for Studio work **2s. 9d.**

The same Release may be had, but fitted with large Teat, for some Studio Shutters, price **3s. 6d.**

SUNDRIES AND ACCESSORIES.

No. 0 Ball only, suitable for working 5 feet of Tubing each **7d.**

No. 1 " " " " 10 " " " " " " **10d.**

No. 2 " " " " 20 " " " " " " **1s. 2d.**

No. 3 " " " " 30 " " " " " " **1s. 6d.**

No. 4 " " " " 60 " " " " " " **2s. 8d.**

Larger Balls can also be supplied.

Extra Teats: Ordinary Plain, 2d. each; Black or Red Enamelled, 3d. each; Arabesque, 3d. each; Extra Strong, Plain Red, 3d. each; Studio, 9d. each.

Tubing: Ordinary, 3d. per foot; Extra Stout, as used for Professional Release, 4d. per foot.

Black Hard Rubber Taps, 1s. each; Brass Screw Connections, 3d. per pair.

Tube Connection, for fastening Tubing to Teat, 1d. each; suitable Wire, 1d. per yard.

N.B.—Tubing can be supplied in any lengths up to 150 feet without a join.

The Large Balls with long tubes are suitable for releasing the shutter when the operator is some distance from the camera, as well as for self-portraiture and with groups, also for studio use. Any length of Tubing can be supplied.

The Anti-Climatic Pneumatic Shutter Release may be used with all Roller-blind Shutters, Iris Shutters on Kodak and other Hand Cameras, and for other kinds of Shutters. Sometimes the teat is not required; when this is the case it can be readily slipped off the tubing.

May be obtained from all Photographic Stock Houses, Photographic Dealers,

Photographic Chemists, and others, or direct from

THE ALTRINCHAM RUBBER CO.,

Crafton Street and Mossburn Buildings, ALTRINCHAM,

Telegrams:—"RUBBER."

Telephone No. 134.

Address for Letters:—MOSSBURN BUILDINGS.

[See previous and following pages.]

HEADQUARTERS for *Rubber & Waterproof Goods*

FOR THE PHOTOGRAPHIC TRADE.

ANTI-CLIMATIC SHUTTER RELEASES

(For Price List see previous page.)

RUBBER FOCUSING CLOTHS, each one neatly boxed.

30½ × 31 in., 1/9; 36 × 36 in., 2/-; 40 × 40 in., 2/6.

Flat Rubber Squeegees, with Polished Baywood Handles.

3 in., 5d.; 4 in., 6d.; 5 in., 8d.; 6 in., 9d.; 7 in., 10d.; 8 in., 1/-; 9 in., 1/2;
10 in., 1/3; 12 in., 1/6 each.

INDIA-RUBBER FINGER and THUMB-STALLS, 6 sizes of each, 2d. each.

Sensitive Finger-Stalls, very thin, same price.

INDIA-RUBBER GLOVES, special quality,

Size 1, 6/6; 2, 7/-; 3, 7/6; 4, 8/- per pair.

WATERPROOF and LEATHER CAMERA CASES,

Over 100 Patterns and Sizes.

Cases of any description made to order in a few hours.

Best value obtainable.

Hand Camera Cases from 2/6 upwards.

Stand Camera Cases from 2/6 upwards.

Cases for Kodaks from 2/6 upwards. Tripod Cases from 2/6 upwards.

Leather Lens Cases from 2/6 upwards.

MOROCCO LEATHER CASES and LENS CAPS. All sizes.

Enlarging Screens, Amber and Ruby Glass.

GREY INDIA-RUBBER BANDS, all sizes.

INDIA-RUBBER CLOTH CUT TO SIZES FOR PRINTING FRAME PADS.

SPECIAL INDIA-RUBBER CLOTH FOR SHUTTER BLINDS.

The ALTRINCHAM RUBBER COMPANY, *Photographic Specialists.*

A. W. S. SANDERSON, Proprietor,

Crafton Street and Mossburn Buildings, ALTRINCHAM,

ALSO AT

ENGLAND.

Brussels, Christiania, Stockholm, Paris, St. Petersburg & Madrid.

Telegraphic Address:—RUBBER, ALTRINCHAM.

Telephone No. 134.

[See preceding pages.

CARL ZEISS, JENA,

Optische Werkstaette,

Berlin NW.,
Dorotheenstr. 29 II.

Frankfurt a. M.

Kaiserstr. 16.

London, W.,
Margaret Str. 29, Regent Str.

Wien IX/3,

Ferstelgasse 1, Ecke Maximilian-Platz.

PHOTOGRAPHIC OBJECTIVES

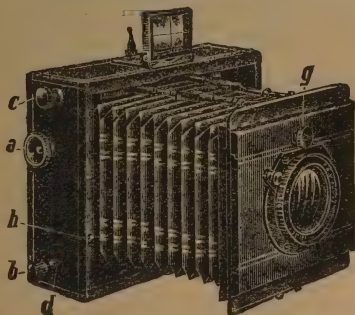
in 3 different types of construction:—

UNAR

PLANAR

PROTAR

For all purposes of Photography.



PALMOS HAND CAMERAS

or Dry Plates and Roll Films, with daylight exchange, are fitted with UNAR and PROTAR.

Minimum-Palmos
Film-Palmos

Universal-Palmos
Tropen-Palmos

Illustrated Price Lists of Objectives and Hand Cameras gratis on application.

Protar, Planar, and Unar are, besides by ourselves, only made and supplied by the following Firms, who have obtained the right of Manufacture:—The BAUSCH AND LOMB OPTICAL CO., Rochester, N.Y. (U.S.A.), and New York City (U.S.A.); KARL FRITSCH, vorm. Prokesch, Vienna; F. KORISTKA, 2, Via G. Revere, Milan; E. KRAUSS, 21 and 23 Rue Albouy, Paris; ROSS, LTD., 111, New Bond Street, London, W.

AUSTRALIA.

THE
Baker & Rouse Proprietary
LIMITED,
Largest Importers, Dealers, and
Manufacturers of
PHOTOGRAPHIC MATERIAL
in the Commonwealth.

CENTRAL DEPOTS IN EACH STATE.

Everything up-to-date in British, American, and Continental leading lines of **Cameras, Lenses,** and all accessories.

Free Dark Rooms for Tourists, and skilled assistance.

Amateurs' Plates or Films Developed, Printed, and Mounted to order.

A staff of competent Mechanics for repair of **Cameras, Phonographs, Optical Lanterns, &c.**

Fresh supplies of **Plates, Films and Papers** of all the best brands by every mail boat.

Edison Phonographs a specialty, and a continuous supply of new records.

Optical Lanterns and Lantern Slides in endless variety.

The Baker & Rouse Proprietary,
LIMITED,

375, George St., SYDNEY; 260, Collins St., MELBOURNE;
81, Queen St., BRISBANE; and 65, Rundle St., ADELAIDE.

AUSTRALIA.

In Optical Goods —

THE

BAKER & ROUSE PROPRIETARY,
LIMITED,

Are always in the lead with the latest and best

**Lenses, Binoculars, Telescopes,
Microscopes, &c., &c.,**

and stock all leading lines of the well-known firm of ROSS, Ltd. (London and Paris), and other makers of note on the Continent and in the United States of America.

MANUFACTURERS, Patentees of Photographic Novelties, and others interested, are invited to communicate with the Proprietary, and to send full information as to Discounts, &c., to the Sydney Office, 375, George Street.

THE AUSTRALASIAN - - PHOTOGRAPHIC REVIEW

(published by the Proprietary) will, owing to its extended circulation throughout the Commonwealth, be found the most effective channel for conveying such information to the purchasing public.

Advertising rates and specimen copies sent on application to—

The Baker & Rouse Proprietary,
LIMITED,

375, George St., SYDNEY; 260, Collins St., MELBOURNE;
81, Queen St., BRISBANE; and 65, Rundle St., ADELAIDE.

HUB SCENIC COMPANY,

No. 1, Brandon Street,

BOSTON, MASS., U.S.A.

BACKGROUNDS.

We are painting the best grade of

**Low-Priced
Backgrounds Sold.**

**Commission Merchants,
DEALERS,
Photographers.**

AMATEURS EVERYWHERE

will do well to keep in touch with us.

Write for our illustrated price list and terms.

**We are shipping BACKGROUNDS to all
PARTS OF THE WORLD.**

START A NEW INDUSTRY!



THE
PIN LOCK
HAND BUTTON
MACHINE.

Height of Machine, 14 inches.
Size of base, 4x9 inches. Weight, 5 lbs.
Weight of dies, about 5 lbs. per set.
EVERY MACHINE WARRANTED.

The new Pin Lock Hand Button Machine is just what you need to make business boom. This machine fills all requirements, is light, strong, and durable, built upon correct mechanical principles, has automatic die release, removable handle, machinery steel frame, making it ten times as strong as though it was cast. Dies can be changed from one set to another without wrench or screw driver in ten seconds. All dies interchangeable, accurately registered, simple of operation, and perfect in every respect. Makes all sizes of rimless buttons, from 22 to 90 line, scarf pins, cuff buttons, hat pins, mirrors, &c.; in fact, anything made on a large machine. Complete instructions given with every machine.

For £3 Sterling we will furnish:

- 1 Pin Lock Hand Machine.
- 1 Set of 36-line Dies.
- 5 Gross 36-line Button Parts complete.
- 2 Sheets 5/1,000 Celluloid, 1,000 square inches to sheet.
- 1 Doz. assorted Gold Plate Photo Frames.
- and 1 Doz. sample Buttons.

Weight of Outfit complete, about 16 lbs.

MANUFACTURING PHOTO BUTTONS.

£3

Will start you on a small scale.



35-line Button.



#123-40-line Oval Brooch

We make a speciality of furnishing Outfits for the Manufacturers of Photo Buttons, Advertising Buttons, &c.

We can start you at an expense of from £3 to £1,000.

Write for our Catalogue of foot power Button Machines, Medallion Machines, Photo Jewellery, &c.

The small manufacturers of to-day are the large manufacturers of to-morrow.

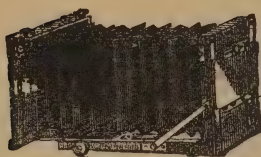
Never before in the history of the world has it been possible to start a splendid paying manufacturing business at so small an expense as is possible at the present time in this line. There is a **fortune** in it for progressive business men.

Send for Catalogue and
Sample of Work.

PHOTO JEWELLERY MFG. CO., 195, 197, 199, State Street,
Chicago, Ill., U.S.A.

SQUARE CAMERAS.

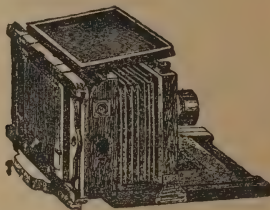
Camera and Three Dark Slides.



$6\frac{1}{2} \times 4\frac{3}{4}$	...	£7 0 0
$8\frac{1}{2} \times 6\frac{1}{2}$	...	9 0 0
12×10	...	12 10 0
15×12	...	15 0 0
18×16	...	18 10 0
24×18	...	27 0 0

Studio Camera and One Dark Slide.

$6\frac{1}{2} \times 4\frac{3}{4}$	...	£5 10 0
$8\frac{1}{2} \times 6\frac{1}{2}$	...	6 10 0
12×10	...	9 10 0
15×12	...	12 10 0



STUDIO STANDS.

PRINTING FRAMES.

CAMERAS REPAIRED.

H. MOORSE,
154, HIGH HOLBORN
 (Near New Oxford Street and Museum Street).

The Kammatograph

PATENT

A FILMLESS CINEMATOGRAPH.

500-600 Pictures on one Glass Plate.

With the Kammatograph an ordinary dry glass plate is used instead of Film. The method of developing Kammatograph plates is exactly the same as with dry plates, thus bringing cinematography within the REACH OF ALL.

Price - £9 9 0

Negative and Positive Plates, $\frac{1}{6}$ each. Subject Plates, $\frac{3}{6}$. 6d. allowed for each plate returned unbroken.



PATENT OXYGEN GENERATORS FOR LIMELIGHT (2,000 c.p.).
PROJECTING LANTERNS. ARC LAMPS AND RESISTANCES.

Catalogue Gratis and Post Free.

L. KAMM & CO., Scientific Engineers,

Works: 27, POWELL ST., GOSWELL ROAD, LONDON, E.C.

Telephone No. 9116, London Wall.

Telegraphic Address: "Zerograph, London."

For the Trade only.

LEATHER & CANVAS CASES

For all Descriptions of Cameras.

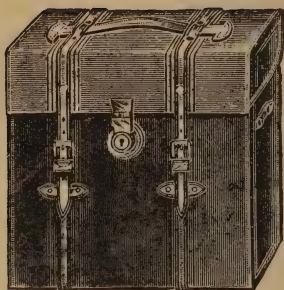
Stand Cases.

**Field Glass
Cases.**



Lens Cases.

**Brush Cases,
&c., &c.**



MANUFACTURED BY

**FAIRBANKS, LAVENDER & SON,
ELDON WORKS, WALSALL.**

Quotations on receipt of Specifications.

NEW ZEALAND.—Special to Tourists.

WALTER SUCKLING'S Central Photographic Stores,

204, CASHEL STREET, CHRISTCHURCH, N. Z.,

Are the most complete of any in the Colony. Full stocks of leading brands of Plates, Papers, etc., are kept. A Dark Room is provided free for use of Customers, and all kinds of Photo work is carried out at moderate prices.

PHOTOGRAPHIC LANTERN SLIDES.

In Sets of 12 Selected Slides at the very low price of 4/- per dozen Plain, and Coloured 6/- per dozen. A large variety of Subjects, New and Original.

SEND FOR LIST.

J. W. MCLELLAN,
PUBLISHER,
4, Highbury Grove, London, N.

Post Cards.

Marine and Local Photographic Cards.
Cards made from Customers' own Negatives.
Write for Wholesale Prices to Trade only.

GODFREY HASTINGS, Whitley Bay, Northumberland.

H. KLEINMANN & CO.,

Fine Art Printers and Publishers,
HAARLEM AND LONDON.

Works: Haarlem.

Reproductions of Paintings and Sketches by the Old Masters.

COLLOTYPE

Specimen and Prices on Application to
92, HATTON GARDEN, LONDON, E.C.

X.L.C.R. ROLLER BURNISHERS SOLE AGENCY.
PLUSH BLOCKS, &c., OPALINE GLASSES
STEREOSCOPES AND VIEWS (Of Everywhere and Humorous)
EVERYTHING PHOTOGRAPHIC New and Second-hand

Please Write for detailed List of any of the above.

H. CORNTHWAITE, PHOTOGRAPHIC DEALER, BIRMINGHAM.

Telegrams, "Voider, London."

Telephone, 4,722 Holborn.

MAGNALIUM.
STRONGER THAN BRASS.
LIGHTER THAN ALUMINIUM.

The most suitable metal for Optical Work—Lens Mounts, Shutters, Tripod Tops, Binding Cameras, &c.

Three degrees of hardness. Can be worked with the ease of brass.

Excellent screws can be cut.

SHEET, ROD, TUBE, CASTINGS, &c.

J. ARTHUR WILLIAMS, 92, Hatton Garden, LONDON.

THE
PHOTOGRAPHER'S COMPANION.

Being a Collection of Hints, Expedients and Formulæ.

BY

EDWARD DUNMORE.

Price 1s. ; post free, 1s. 2d. Cloth, 1s. 6d. ; post free 1s. 8d.

HENRY GREENWOOD & CO., PUBLISHERS,
 24, Wellington Street, Strand, London.

*And may be obtained from ALL Photographic Dealers and Bookse'lers
 throu hout the World.*

NEW ZEALAND

Photographic Goods AND Sundries.

DARK ROOM for TOURISTS.

CAMERA COMPANY, DUNEDIN.

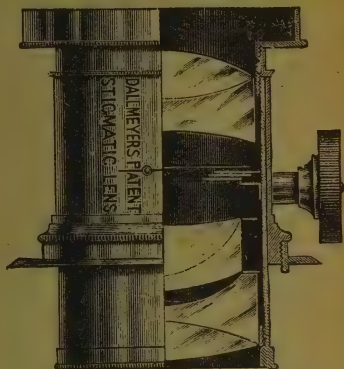
THE DALLMEYER STIGMATIC LENSES.

(PATENT.)

—❁—
SERIES I.

PORTRAIT LENS,

F/4.
—❁—



No.	Largest dimensions of Plate covered at full aperture.	Equiv. Focus.	PRICE.					
			With rack and pinion movement.					
			Waterhouse Diaphragm.			Iris Diaphragm.		
	In.	In.	£	s.	d.	£	s.	d.
1	4½ × 3½	11	7	0	0	7	10	0
2	5 × 4	7½	12	0	0	12	15	0
3	6½ × 4¾	9	18	0	0	19	5	0
4	8½ × 6½	12	25	0	0	26	10	0

Nos. 1 and 2 are specially adapted for Carte de Visite Pictures, and **Nos. 3 and 4** for Cabinets. It is, however, recommended that the larger size be used in preference, on account of the greater length of focus producing better perspective in the resulting image.

Distance between subject and lens for a Carte de Visite standing figure :—**No. 1**, 12 ft.; **No. 2**, 15 ft.; **No. 3**, 18 ft. For a Cabinet standing figure :—**No. 3**, 12-13 ft.; **No. 4**, 17 ft. Head and bust Pictures, about half these distances.

DESCRIPTION.—This Lens has been designed to give uniform definition through a larger angle than existing forms of rapid Portrait Lenses. At the full aperture of *f*/4, it is practically free from spherical aberration, i.e., gives a perfectly defined image. It is non-distorting, and gives a flat field with equal definition from edge to centre, and with but very slight remaining traces of astigmatism. It covers altogether an angle of about 60°—hence is particularly adapted for short operating rooms, and has greater equality of illumination than existing Portrait Lenses.

Note.—This Lens possesses the same advantage as our "Patent Portrait Lens" system, in that by unscrewing the back cell a turn or part of a turn, a certain amount of spherical aberration is introduced, resulting in more equal distribution of definition over the planes focussed.

J. H. DALLMEYER, LTD.,

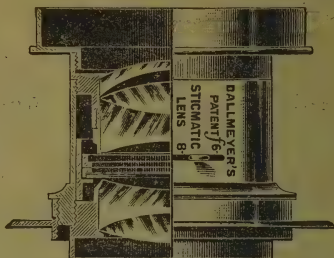
**25, NEWMAN STREET,
Oxford St., London, W.**

THE DALLMEYER STIGMATIC LENSES (PATENT).

Series II.

A New Universal
Lens, F 6.

Absolute Freedom
from Astigmatism,
and a
Perfectly Flat
Field.



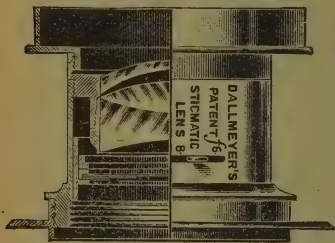
Extreme Speed.

Great Covering
Power.

Can be made to
serve as
Four Different
Lenses.

THIS LENS is suitable for every class of Photography from Portraiture to Wide-angle Work.

The smaller sizes are particularly suited for Hand-camera Work, covering the plate to the edges at full aperture (F/6). At a smaller aperture (F/16) they will cover a plate at least 2 sizes larger, thus embracing a very Wide Angle. Besides this, each combination may be used separately, the back combination having a focal length of about $1\frac{1}{2}$ times, and the front twice that of the entire lens. Thus a "Stigmatic" does the work of four ordinary lenses.



Front Combination used as Single Lens.

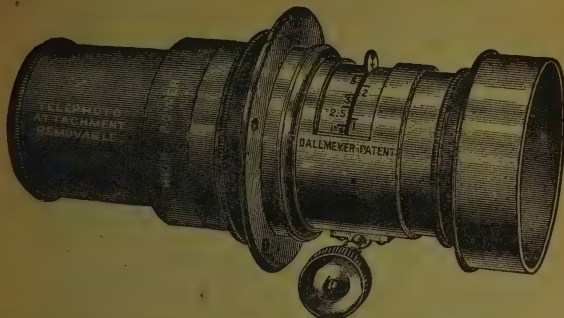


Back Combination used as Single Lens.

No.	Plate covered at full aperture, f/6.	Largest Plate covered at f/16.	Eq. Focal length.	PRICE, with Iris Diaphragms.
1AA	$2\frac{1}{2} \times 2$	—	3.25 In.	£4 0 0
1A	$3\frac{1}{4} \times 2\frac{1}{4}$	—	4	4 5 0
1	$3\frac{1}{2} \times 3\frac{1}{2}$	$6\frac{1}{2} \times 4\frac{3}{4}$	4.5	4 15 0
2	$4\frac{1}{4} \times 3\frac{1}{4}$	8×5	5.3	5 15 0
3	5×4	$8\frac{1}{2} \times 6\frac{1}{2}$	6.1	6 15 0
4	$6\frac{1}{2} \times 4\frac{3}{4}$	10×8	7.6	8 2 6
5	8×5	12×10	9	10 10 0
6	$8\frac{1}{2} \times 6\frac{1}{2}$	15×12	10.7	13 10 0
7	10×8	15×15	12.7	18 10 0
8	12×10	18×16	15.1	24 10 0
9	15×12	22×20	18	31 10 0

J. H. DALLMEYER, LTD., 25, NEWMAN STREET, Oxford St., London, W.

DALLMEYER'S TELEPHOTOGRAPHIC LENSES.



SERIES 1.—HIGH POWER.—Consisting of a Portrait Lens and a high-power Negative of about one-fourth the focal length of Portrait Lens.

		Mounted in	
		Brass.	Aluminium
No. 1.	PATENT STEREO LENS, with Iris Diaphragms, and No. 1 Negative (1'6 in. focus)	£7 15 0	£9 5 0
No. 2.	1 B PATENT PORTRAIT LENS, with Iris Diaphragms, and No. 2 Negative (1'8 in. focus)	11 10 0	13 7 6
No. 3.	2 B PATENT PORTRAIT LENS, with Iris Diaphragms, and No. 3 Negative (2'4 in. focus)	18 17 6	21 2 6

The negative elements alone can be adapted to any existing Patent Stereo, 1 B or 2 B Patent Portrait Lenses at the following prices:—

No. 1.	NEGATIVE	In Brass £2 15 0	In Aluminium £3 5 0
No. 2.	"	" 3 15 0	" 4 7 6
No. 3.	"	" 4 17 6	" 5 12 6

SERIES 2.—MODERATE POWER.—Consisting of a Portrait Lens and a Moderate Power Negative of about half the focal length of Portrait Lens.

		Mounted in	
		Brass.	Aluminium.
No. 1.	PATENT STEREO LENS, with Iris Diaphragms, 2½ in. focus negative	£3 10 0	£10 0 0
No. 2.	1 B PATENT PORTRAIT LENS, with Iris Diaphragms, and 3 in. focus negative	11 5 0	13 2 6
No. 3.	2 B PATENT PORTRAIT LENS, with Iris Diaphragms, and 4 in. focus negative	18 5 0	20 10 0

The negative elements alone can be adapted to any existing Patent Stereo, 1 B or 2 B Patent, or similar Portrait Lenses at the following prices:—

2½ in.	NEGATIVE	In Brass £3 10 0	In Aluminium £4 0 0
3 in.	"	" 3 10 0	" 4 2 6
4 in.	"	" 4 5 0	" 5 0 0

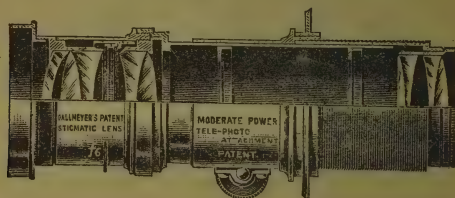
Prices of larger sizes on application.

SERIES 1 and 2 combined.—In this case the same Portrait Lens is utilised, and an adjustable mount fitted, capable of carrying both a high and a moderate power negative, which are supplied.

J. H. DALLMEYER, LTD., 25, NEWMAN STREET, Oxford St., London, W.

DALLMEYER'S TELEPHOTOGRAPHIC LENSES.

III. MODERATE POWER. Consisting of an R. R. Lens and a moderate power negative of about half its focal length.



The prices of the Negative Elements alone are here given. As the Positive Element, either the 'Rapid Rectilinear' or the 'Stigmatic' may be employed.

Focus of Negative Element	2½ in.	3 in.	4 in.	5 in.	6 in.	7 in.	8 in.	10 in.	12 in.
Diameter	1 in.	1¼ in.	1½ in.	1¾ in.	2 in.	2¼ in.	2½ in.	2¾ in.	3 in.
Price, with Rack and Pinion, Movement in Brass	£ s. 3 15	£ s. 3 15	£ s. 4 10	£ s. 5 5	£ s. 6 0	£ s. 7 0	£ s. 8 10	£ s. 11 0	£ s. 14 0
Do., do., in Aluminium	4 10	4 10	5 5	6 10	7 5	8 10	10 0	12 10	15 10

TELEPHOTOGRAPHIC ATTACHMENTS TO OTHER THAN 'DALLMEYER' LENSES.

The great advantage of System III. is that the negative attachments can be adapted to any existing Lenses by first-class makers (Rapid and Universal Symmetricals, Double Anastigmats, &c.), provided the rapidity of the positive lens be not slower than 78. The attachments can be easily removed and in common with all our negative attachments will not in any way interfere with the ordinary working of the positive Lenses when used alone.

In all cases the Lens must be sent to be fitted. As a general rule a negative Lens of half the focal length of the positive Lens should be employed, thus an ordinary half-plate Rapid Rectilinear of 8 inches focal length requires a 4 in. negative, and so on.

J. H. DALLMEYER, LTD., 25, NEWMAN STREET,
Oxford St., London, W.

DALLMEYER'S PATENT PORTRAIT LENSES.



These are manufactured in three degrees of
intensity or rapidity of action :—

1st. Quick-acting Portrait Lenses,

Intensity $F/3.16$; designated B.

2nd. Portrait Lenses,

Intensity $F/4$; designated A.

3rd. Portrait, Group, & View Lenses,

Intensity $F/6$; designated D.

The denominators of the fractions expressing intensity of the Lenses above mentioned, viz., 3, 4, 6, when *squared*, at once express the relative time of exposure for each Lens. Thus the B series require about *one-half* the exposure of A and *one-fourth* of D.

DESCRIPTION.—These Lenses are constructed on a different principle to the old or Petzval type of Portrait Lenses, and excel them in sharpness of definition, in freedom from distortion and flare, and in equality of illumination; whilst, in addition to this, they afford the means, by the simple turn of a screw, of obtaining greater equality or depth of definition.

The construction of the Lens is such that, with the posterior cell of the back combination screwed *home*, it produces the sharpest possible picture of objects situated in *one plane*. Then, by unscrewing the posterior cell, a turn, or parts of a turn, the previous intensely sharp definition becomes modified, *i.e.*, the contrast of excessive sharpness in one plane, compared with great want of sharpness in other planes, is balanced, producing the impression of a general distribution or depth of focus; and this in proportion to the amount of unscrewing. Nothing has been sacrificed in securing this *new power*, and it can be used *or not* at the *will* of the operator.

DALLMEYER'S PATENT PORTRAIT LENSES (B).

		Waterhouse		Iris	
		Diaphragm.		Diaphragm.	
No. 1	B PATENT LENS, with rack and pinion movement. Diameter of Lenses, 2 in., and equivalent focus 6 in. For CARTE DE VISITE PORTRAITS. Distance between subject and lens for standing figure, 12 to 13 ft. ..	£7	0	0	£7 15 0
No. 2	B DITTO DITTO, with rack and pinion movement. Diameter of Lenses, 2½ in., and equivalent focus 8½ in. Especially constructed for CARTE DE VISITE PORTRAITS. Distance between subject and lens for a standing figure, 18 ft. ..	12	15	0	14 0 0
No. 3	B DITTO DITTO. Diameter of Lenses, 3½ ins., and equivalent focus 11½ in. Especially constructed for the CABINET PORTRAITS. Distance between subject and lens for a standing figure, 18 ft.; for Carte de Visite, 25 ft. ..	19	0	0	20 10 0
No. 4	B DITTO DITTO. Diameter of Lenses, 4½ in., and equivalent focus, 17 in., for pictures 8½ × 6½, and under. Distance for a Cabinet Portrait (standing figure), 25 ft. ..	38	0	0	40 10 0

J. H. DALLMEYER, LTD., 25, NEWMAN STREET,
Oxford St., London, W.

Dallmeyer's Patent Portrait Lenses (A).

No.	A* PATENT LENS, with rack and pinion movement.	Diameter of front and back combinations,	2½ and 2½ in. respectively, and 10 in. equivalent focus; for pictures 5×4 in.	...	...	...	Waterhouse Iris Diap. Diap.
No. 1	A* PATENT LENS, with rack and pinion movement.	Diameter of front and back combinations, 2½ and 2½ in. respectively, and 10 in. equivalent focus; for pictures 5×4 in.	...	...	...	...	£12 10 13 15
No. 2	A* PATENT LENS, with rack and pinion movement.	Diameter of front and back combinations, 3½ and 3½ in. respectively; 13½ in. equivalent focus; for pictures 6½×4½ in.	...	...	...	...	17 0 18 10
No. 3	A* PATENT LENS.	Diameter of Lenses, 4 in. and 16 in. equivalent focus; for pictures 8½×6½, and Promenades and Cabinets	...	...	...	...	26 0 27 10
No. 4	A PATENT LENS.	Diameter of Lenses, 4½ in. and 18 in. equivalent focus; for pictures 10×8 in. and under	...	...	...	...	36 10 38 10
No. 5	A, IN RIGID MOUNT.	Diameter of Lenses, 5 in., and 22 in. equivalent focus; for pictures 15×12 in. and under	...	...	...	...	47 10 49 10
No. 6	A, IN RIGID MOUNT.	Diameter of Lenses, 6 in. and 30 in. equivalent focus; for pictures 20×16 in., and under	...	...	...	...	57 0 59 10

* These Lenses are well adapted for the Cabinet Portraits, according to length of gallery.—Thus No. 1 A requires a distance of 14 feet between subject and lens (not recommended if a longer focus lens can be used). No. 2 A, 20 feet, and No. 3 A, 24 feet for a full length figure.

Dallmeyer's Patent Portrait and Group Lenses (D).

These require about twice the exposure of the A, and nearly four times that of the B lenses. They are more especially designed for groups in the open air, or for 'studies' in the studio. For out-door subjects, these lenses are generally useful, whether for groups, instantaneous effects, architecture, or landscapes; for, in common with all the Patent Portrait Lenses, they are free from a central 'flare spot,' even when used with the smallest diaphragms; and they are entirely free from distortion.

With the exception of Nos. 2 D and 3 D, these Lenses are mounted in rigid setting, *i.e.*, without rack and pinion movement.

No.	Diameter of Lenses.	Equiv. Focus.	Size of Portrait or Group.	Size of View.	Waterhouse Diaphragm.	Iris Diaphragm.
No. 2 D*	1½ in.	9 in.	6½ × 4½ in.	8 × 5	£ 6 15 0	£ 7 5 0
No. 3 D*	2½ "	12½ "	8½ × 6½ "	10 × 8	9 0 0	9 15 0
No. 4 D	2½ "	17 "	10 × 8 "	12 × 10	13 0 0	14 5 0
No. 5 D	3½ "	19 "	12 × 10 "	15 × 12	16 12 6	18 2 0
No. 6 D	4 "	24 "	15 × 12 "	18 × 16	25 5 0	26 15 0
No. 7 D	5 "	30½ "	18 × 16 "	22 × 20	45 15 0	47 15 0
No. 8 D	6 "	37 "	22 × 20 "	25 × 21	55 10 0	58 0 0

* Distance for a full-length Cabinet with No. 2 D 14 feet (not recommended where a longer focus lens can be used), with No. 3 D 18 feet.

Dallmeyer's 'Extra' Quick-Acting Portrait Lenses (C). F/2.2.

These are the quickest acting lenses usually made, although J. H. DALLMEYER, Ltd., are prepared to construct lenses, having an intensity of a little under F1, for special purposes. For experiments in colour photography, cinematography, &c., the C Series will be found invaluable.

PRICES AND PARTICULARS ON APPLICATION.

The Dallmeyer Berghem Lens for Artistic Portraiture.

Now in use by most leading portraitists at home and on the Continent, many of the most generally admired studies in the recent Exhibitions having been made with it. The power of obtaining a very desired degree of softness, together with the power of varying the focal length, make this lens a valuable tool for the modern portraitist.

	PRICES.					Waterhouse Diaphragm.	Iris Diaphragm.
No. 1. CABINET and BOUDOIR	£5 0	£6 5
No. 2. 8½ × 6½ to 15 × 12	8 10	10 0
No. 3. 10 × 8 to Life-size	10 10	12 0

J. H. DALLMEYER, LTD., 25, NEWMAN STREET, Oxford St., London, W.

DALLMEYER'S RAPID RECTILINEAR LENS.

No.	Size of View or Landscape.	Size of Group or Portrait.	Diam. of Lens.	Equiv. Focus.	PRICE.		
					Rigid Setting. Iris or Waterhouse Diaphragms.	Aluminium Settings. Rigid. Iris or Waterhouse Diaphragms.	Suitable Telephone Attachment Brass.
			In.	In.	£ s. d.	£ s. d.	£ s. d.
1	4½ × 3½	3½ × 3½	5 7/8	4	3 10 0	3 17 6	3 15 0
2	5 × 4	4½ × 3½	6 1/4	4	4 5 0	4 15 0	3 15 0
3	6½ × 4½	5 × 4	1 1/4	8½	5 5 0	5 15 0	4 10 0
4	8 × 5	6 × 5	1 1/2	10	6 0 0	7 0 0	5 5 0
5	8½ × 6½	7 × 5	1 3/4	11	6 12 6	7 12 6	6 0 0
6	10 × 8	8½ × 6½	1 7/8	13	8 10 0	9 15 0	7 0 0
7	12 × 10	10 × 8	2	16	10 10 0	11 15 0	8 10 0
8	13 × 11	11 × 9	2 1/4	17	11 10 0	12 15 0	8 10 0
9	15 × 12	12 × 10	2 1/2	19½	14 5 0	15 12 6	11 0 0
10	18 × 16	15 × 12	3	24	19 0 0	20 10 0	14 0 0
11	22 × 20	18 × 16	3 3/4	30	25 15 0	27 5 0	—
12	25 × 21	22 × 20	4	33	31 10 0	33 0 0	—

EACH LENS WITH SMALLER STOPS, CAN BE USED FOR THE NEXT SIZE LARGER OF PLATE.

Larger sizes of these lenses are constructed to order only.



DALLMEYER'S WIDE-ANGLE RECTILINEAR LENS.

These lenses are mounted in *rigid* tubes or settings, with rotating stops, or Iris diaphragm. In the table below the largest size of plate covered by each lens is recorded; and if *microscopic* definition up to the margins be required, the smallest, or smallest but one, stop should be used.

No.	Largest Dimension of Plate.	Diameter of front. Combination.	Back Focus.	Equivalent Focus.	PRICE.	
					Rotating Stop.	Iris Diaphragm.
	Inches.	Inches.	Inches.	Inches.	£ s. d.	£ s. d.
*1AA	7 × 5	7 1/8	3 1/2	4	4 5 0	4 12 6
1A	8½ × 6½	1 1/4	4 1/2	5 1/2	5 5 0	5 12 6
1B	10 × 8	1 1/2	5 1/2	6 1/2	6 5 0	6 15 0
1	12 × 10	1 3/4	6 1/2	7	7 5 0	7 15 0
2	15 × 12	2	7 1/2	8 1/2	10 0 0	10 10 0
3	18 × 16	2 1/4	11	13	13 5 0	14 0 0
4	22 × 20	3	14	15 1/2	19 0 0	20 0 0
5	24 × 21	3 1/4	17	19	28 10 0	29 15 0

* This Lens is also well adapted for Stereoscopic Views.

DESCRIPTION.—The Wide-angle Rectilinear Lens works at an intensity of *f/16*. It embraces angles of pictures of *nearly* 100° when used with the smallest stop, and is entirely free from distortion and flare; although not aplanatic like the *Rapid Rectilinear*, it works with perhaps a larger opening than most of the existing wide-angle double combination lenses.

J. H. DALLMEYER, LTD., 25, NEWMAN STREET, Oxford St., London, W.

DALLMEYER'S NEW TELEPHOTO LENS.



The ADON (ACTUAL SIZE).

THIS Lens is of entirely novel design, and is primarily intended for use with hand cameras.

The essential differences between this and other Telephoto Attachments are:—

1. It is screwed into the **hood** or **front cell** of the lens instead of being attached to the **back** of the lens, **as in all previous constructions**. This renders its use possible with cameras fitted with immovable lenses and convenient with all others.
2. In previous constructions the magnification of the image has been accompanied by loss of illumination in exact proportion to the increased area. The initial intensity of the positive lens is, therefore, reduced immediately magnification commences. In the **'ADON'** lens, however, owing to the front combination being of larger size than the front of the ordinary lens, this loss of intensity is greatly diminished for corresponding magnifications, and under some circumstances the initial intensity of the positive lens is even maintained.
3. The **'ADON'** is adjusted to transmit parallel rays, so that if it is attached to a camera fitted with a lens set to 'infinity' the magnified image will be sharply focussed upon the same plane, or, in other words, the 'fixed focus' is the same whether the **'ADON'** be used or not. The size of the circle illuminated will depend upon the form of the ordinary lens to which the **'ADON'** is fitted; if the lenses are widely separated, or the tube of the lens be long, the circle of illumination will not cover the plate at the 'infinity focus.' An adjustment is, however, provided for altering the separation between the components of the **'ADON'**, and by means of this a larger circle can be covered after increasing the camera extension. By means of this adjustment either near or distant objects may be focussed at any desired camera extension.

J. H. DALLMEYER, LTD., 25, NEWMAN STREET,
Oxford St., London, W.

4. The 'ADON' is not only a Telephotographic Attachment, but a TELEPHOTOGRAPHIC LENS OF HIGH POWER COMPLETE IN ITSELF, and can be arranged to take the place of the ordinary lens in cases when the latter can be conveniently removed. The 'ADON' is fitted in an adjustable mount, so that images of varying magnification may be obtained with varying camera extensions. The circle of illumination at any given camera extension is considerably greater when the 'ADON' is used alone.

The 'ADON' is made in one size only, suitable for all ordinary $\frac{1}{4}$ -plate or 5×4 lenses, or for use alone upon plates up to 12×10 .

PRICE (including case and adapting to lens), £3 10s.

BURCHETT'S COLOUR SCREENS.

J. H. DALLMEYER, LTD., Sole Licensees and Manufacturers.

THE 'Burchett' Colour Screens are a very considerable advance on the old orange screen and other methods hitherto employed to secure the true monochromatic value of the colours met with in Nature. They are the outcome of a series of practical experiments by the inventor, and are manufactured in three descriptions.

- I. A very light yellowish green. Increase of exposure: $1\frac{1}{2}$ -2 times.
- II. NEW SERIES.—A Screen consisting of an optically worked disc of a particular shade of *light olive green* used in conjunction with a very light *amber* one. Approximate increase of exposure: $2\frac{1}{2}$ -3 times.
- III. 'STANDARD.'—Similar to No. II., but the green glass is considerably darker in colour. Increase of exposure: 9 times.

The No. I. Screen may be employed for very rapid effects and for portraiture. Whilst not perhaps giving the fine results obtained with the use of the green and yellow glass, it has sufficient orthochromatic effect to improve vastly the rendering of skies and foliage, while *barely doubling the exposure*.

No. II. Screen is recommended for all ordinary work. *Either Isochromatic or ordinary plates can be used*, the former where the delicacy and refinement is wanted, and the latter where the object aimed at is more a contrast of light and shade.

No. III. is specially adapted for open landscape, copying paintings, and reproductions for photo mechanical work. Here Isochromatic plates give better results.

PRICES.

Fitted in removable settings to Lenses where the inside

Diameter of the Tube does not exceed $1\frac{1}{4}$ in.	..	..	..	..	12/6
Ditto ditto $1\frac{1}{2}$ in.	..	..	..	..	15/-
Ditto ditto 2 in.	..	..	..	..	17/6
Ditto ditto $2\frac{1}{2}$ in.	..	..	..	..	22/6
Ditto ditto 3 in.	..	..	..	..	30/-

These prices are *strictly nett*, and do not include cost of Carriage on returned Lenses. Larger sizes and square shapes will be specially quoted for.

Pull-off Morocco Cases to fit Screens when not in use, up to $1\frac{1}{4}$ in. 2/-; $1\frac{1}{2}$ in. 2/3; 2 in. 3/-; $2\frac{1}{2}$ in. 4/-; 3 in. 5/-.

FITTING.—Where screen is fitted to back of Lens, we require in all cases the *back cell*, in which a screw has to be cut. If the lens is not of our manufacture (any make can be fitted with the screens) it is imperative that the lens itself be forwarded. Measurements will *not* suffice.

J. H. DALLMEYER, LTD., 25, NEWMAN STREET, Oxford St., London, W.

CINEMATOGRAPH LENSES,

FOR TAKING THE NEGATIVES.

SPECIAL B LENS, $f4$, 2 in. equiv. focus, covers $1 \times \frac{3}{4}$ in. (with focussing flange)	£2 0 0
DITTO, DITTO, with Iris	2 7 6
DITTO, DITTO, 3 in. equiv. focus	3 15 0
SPECIAL STIGMATIC, $f/5$, 3 in. equiv. focus, with Iris	3 15 0
PATENT STEREO LENS, $f4$, 5 in. equiv. focus, covers $3\frac{1}{4} \times 3\frac{1}{4}$ in. (with rack and pinion)	4 10 0
DITTO, DITTO, with Iris	5 0 0
MEDALLION LENS, $f2.2$, $1\frac{1}{2}$ in. equiv. focus, covers $\frac{3}{4} \times \frac{3}{4}$ in.	2 7 6
MINIATURE LENS, $f2.2$, 3 in. " " 2×2 in. (with rack and pinion)	5 10 0

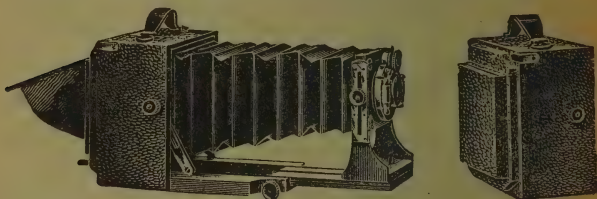
FOR PROJECTION.

SPECIAL LANTERN LENS, $f2.2$, 2 in. equiv. focus, covers $1 \times \frac{3}{4}$ in. (with rack and pinion)	3 15 0
---	--------

The Miniature and Medallion Lenses are also well adapted for Projection work.

Special Mountings adapted to any machine to order.

THE CORRESPONDENTS' CAMERA.



THIS Camera has been designed for the use of correspondents, artists, and other travellers who, while requiring a Camera possessing the greatest stability, cannot spare the space for a regular field camera in addition to a hand camera. When fully extended it is quite rigid, and is therefore well adapted for Telephoto work. It is fitted with a removable focussing hood, which enables the focussing cloth to be dispensed with. A focal plane shutter or roll holder can readily be fitted if desired. It has rising and swing front, swing back, and reversing frame for taking upright or horizontal pictures at will. It is made of the best mahogany, carefully finished and covered with hard morocco leather, or polished in natural colour or ebonized at same price.

Price, including 3 double slides, but without lens or shutter.

$4\frac{1}{2} \times 3\frac{1}{4}$	5×4	$6\frac{1}{2} \times 4\frac{3}{4}$
£5 15 6	£6 10 0	£7 15 0

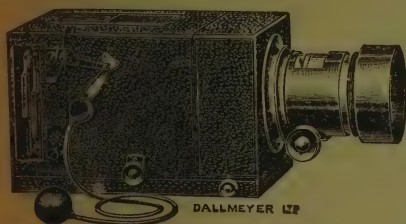
J. H. DALLMEYER, LTD., 25, NEWMAN STREET, Oxford St., London, W.

DALLMEYER'S NEW 'NATURALISTS' HAND CAMERA.



THIS instrument, which is a modification of the original 'Naturalists' Camera,' for which the Medal of the Photographic Society of Great Britain was awarded in 1894, is superior to its prototype in many details, the more important of which are—

1. Great accuracy in focussi g.
2. Adaptability for use with ordinary as well as telephoto lenses.
3. The power to use the telephoto lens at varying magnifications.
4. Portability.
5. Increased facilities for manipulating the shutter, which is now of the well-known Anschütz pattern.
6. A greatly increased field in the focussing eyepiece, a clear 2-in. circle being covered.



The appearance of the camera as now constructed is clearly shown in the accompanying blocks, from which it will be seen that the telescopic eyepiece used in the original pattern has been replaced by a specially designed eyepiece, which is more conveniently placed for use when the instrument is used in the hand.

The value of a camera which can be held in the hand and yet give a representation of an object on the same scale as that given by an ordinary lens of any focal length up to 45 inches must be evident to every photographer, but more particularly to naturalists (for studies of birds and animals), marine photographers, newspaper correspondents, and all who have to photograph inaccessible or shy subjects. Add to this, that the camera is perfectly adapted for ordinary snap-shot work, using lenses of 6-in. focal length and upwards, and it must be acknowledged that its powers far exceed those of any camera previously offered to the photographic world.

Price in $\frac{1}{4}$ -plate size, fitted with 2B Patent Portrait Lens, and 4-in.

Negative Attachment mounted in Aluminium £32 15 0

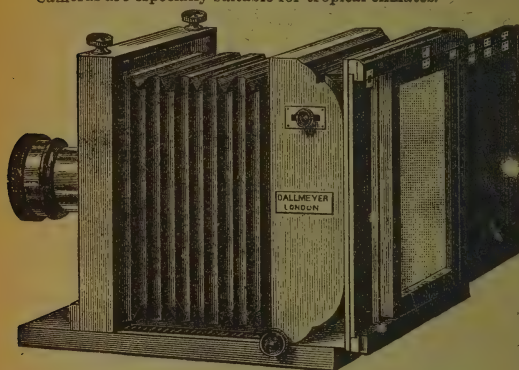
Or with 1B Lens and 3-in. Negative Attachment £25 10 0

The above prices include 6 solid double Slides, or Changing-box for 12 plates.

J. H. DALLMEYER, LTD., 25, NEWMAN STREET,
Oxford St., London, W.

Photographic Cameras and Appliances.

ALL cameras and accessories are constructed of the finest material only. They embody the most recent improvements in camera construction, and particular attention has been paid to rendering them as light and compact as possible, without falling into the fatal error of sacrificing *rigidity* to *lightness*. The portable Field Cameras are especially suitable for tropical climates.



Dallmeyer's Universal Studio Camera.

This is so arranged that two C.D.V. Portraits may be taken on the half or whole plate sizes, or two Cabinet Pictures on the whole plate or 9×7 size. Also for Promenade, Boudoir Panel, and Imperial Portraits. The 10×8 and larger sizes can also be fitted to take two separate half-plates side by side; thus if a second exposure be not required the plate is not wasted.

PRICES (with one Single Slide, two inner Frames, and Focussing Screen).

	6½ in. sq.	8½ in.	9 in.	10 in.	12 in.	15 in.
For Plates ..	6½ × 4½	8½ × 6½	9 × 7	10 × 8	12 × 10	15 × 12
	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Swinging Back	6 0 0	7 7 0	7 17 6	9 0 0	10 15 0	15 15 0
Double Swing	7 0 0	8 10 0	9 2 6	10 2 6	12 10 0	17 15 0

Brass Binding to 9×7 and under, 25/- extra; above 9×7, 30/- extra.

Rackwork fitted to Swinging Back from 10/6 each Swing.

Larger sizes specially quoted for.

Parallel Bellows Camera.

This camera is strongly recommended wherever lightness is not of primary importance.

It is very suitable for tropical climates and the best camera for telephoto work.

PRICES (with one Double Back and Hinged Screen).

For Plates.	Square with Reversible Back and Parallel Bellows	Brass Binding extra.	Extra Double Backs.	
				Brass Binding extra.
	£ s. d.	£ s. d.	£ s. d.	£ s. d.
4½ × 3½	5 15 0	0 13 6	0 16 0	0 4 0
5 × 4	6 12 6	0 15 0	0 18 0	0 4 6
6½ × 4½	8 0 0	1 0 0	1 2 6	0 4 6
8½ × 6½	9 12 6	1 0 0	1 7 6	0 4 6
10 × 8	11 5 0	1 5 0	1 14 0	0 5 0
12 × 10	12 17 6	1 10 0	2 2 0	0 5 6
15 × 12	15 17 6	2 2 0	3 0 0	0 6 0
18 × 16	24 10 0	2 15 0	4 10 0	0 6 6

J. H. DALLMEYER, LTD., 25, NEWMAN STREET,
Oxford St., London, W.

THE DALLMEYER HAND CAMERA. QUARTER-PLATE SIZE.



Long Extension Pattern Showing Rising Front.

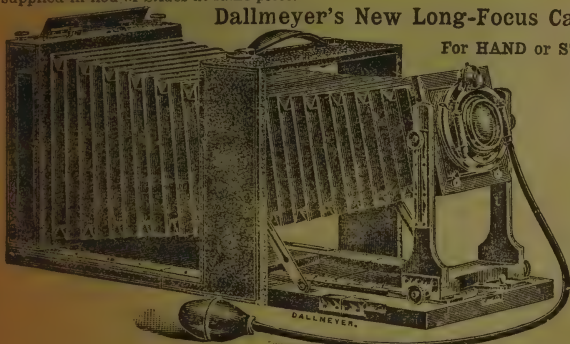
THIS is the most simple and practical instrument which can possibly be designed. There is no complicated or delicate mechanism to get out of order, and the workmanship and materials are of the highest class. It is particularly suited for **All-round Use**, as its varied adjustments enable every description of photographic work to be undertaken with success. **DARK SLIDES** of an entirely novel form are supplied, and are a special feature of the camera. They are perfectly light-tight, and open book-form by means of a small lever, the shutters being made of thin corrugated sheet steel to ensure rigidity with compactness, and at the same time to avoid the possibility of reflection when the slide is open inside the Camera. The slides are very light and thin, 6 double slides occupying a space of 2½ in. only. Two best **BRILLIANT VIEW FINDERS** are fitted, and either **THORNTON-PICKARD** or **UNICUM SHUTTER** at option of purchaser.

PRICE.

Original pattern, with sliding body and rack focussing for lenses of ordinary focal, including Series 1, No. 2 Stigmatic Lens, six Double Dark Slides, and Solid Leather Case £13 8 6
Dark Slides supplied separately, 7s. each.
 Long Extension Pattern, giving twelve inches from flange to focussing screen, with Lens, &c., as above £14 18 6
 Customers' Own Lenses fitted. An Automatic Changing Box for 12 plates can be supplied in lieu of Slides at same price.

Dallmeyer's New Long-Focus Camera,

For HAND or STAND.



Can be used with Lenses of any focal length, and is very suitable for Tele-photo work.

Full particulars on application.

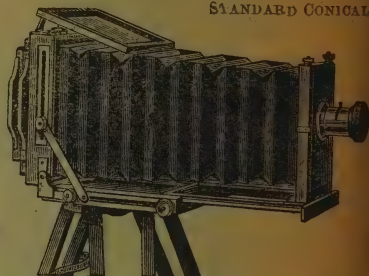
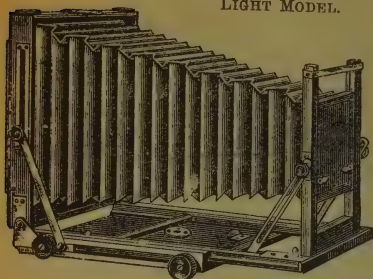
Price, including 3 Slides, without Lens or Shutter.
 Quarter-plate, £6 12 6 - 5 × 4, £7 10 0 - Half-plate, £8 18 6

J. H. DALLMEYER, LTD., 25, NEWMAN STREET,
Oxford St., London, W.

LIGHT FIELD CAMERAS.

LIGHT MODEL.

STANDARD CONICAL.



NEW LIGHT MODEL CAMERA.

THE Camera has been designed to give the maximum of rigidity and strength with the minimum of bulk and weight. It is, however, constructed—as are all our Cameras—of the finest Spanish Mahogany, and all brass work is finished by hand in the best possible manner, all the wearing parts being made in the same solid manner as those of the Standard Pattern.

PRICES (including one Double Slide).

	Camera and One Double Slide.	Brass Binding extra.	EXTRA DOUBLE BACKS.	
			Each.	Brass Binding extra.
$6\frac{1}{2} \times 4\frac{1}{2}$	£7 12 0	£1 0 0	£1 0 0	£0 4 6
$7\frac{1}{2} \times 5$	8 0 0	1 0 0	1 1 0	0 4 6
$8\frac{1}{2} \times 6\frac{1}{2}$	9 0 0	1 0 0	1 7 6	0 4 6
10×8	10 2 6	1 5 0	1 14 0	0 5 0
12×10	11 7 6	1 10 0	2 2 0	0 5 6
15×12	13 12 6	2 2 0	3 0 0	0 6 0

CONICAL BELLOWS CAMERA (Standard Model).

This Camera is rather heavier and more solidly constructed than the Light Model, and is to be preferred for rough work. The front will carry comparatively large lenses, and permits of considerable movement of the lens. For architectural work it is almost equal to the Parallel Bellows Pattern. It is also well suited for telephoto lenses.

PRICES (with one Double Back and Hinged Screen).

For Plates.	Square, with Reversible Holder & Conical Bellows.	Brass Binding extra.	EXTRA DOUBLE BACKS.	
				Brass Binding extra.
$4\frac{1}{2} \times 3\frac{1}{2}$	£5 12 6	£0 13 6	£0 16 0	£0 4 0
5×4	6 10 0	0 15 0	0 18 0	0 4 6
$6\frac{1}{2} \times 4\frac{1}{2}$	7 12 6	1 0 0	1 2 6	0 4 6
$8\frac{1}{2} \times 6\frac{1}{2}$	9 0 0	1 0 0	1 7 6	0 4 6
10×8	10 2 6	1 5 0	1 14 0	0 5 0
12×10	11 7 6	1 10 0	2 2 0	0 5 6
15×12	13 12 6	2 2 0	3 0 0	0 6 0
18×16	21 10 0	2 15 0	4 10 0	0 6 6

J. H. DALLMEYER, LTD., 25, NEWMAN STREET, Oxford St., London, W.

DALLMEYER'S POPULAR HAND CAMERA. ($\frac{1}{4}$ -plate size.)

J. H. DALLMEYER, Ltd., have much pleasure in introducing the above Camera to the photographic public, as they feel that the many advantages it presents and the very reasonable price at which it is offered will ensure its favourable reception. It has



been constructed after many careful and expensive experiments, and embodies all the best features of several previously successful patterns with the addition of the new lens, which renders it far superior to any Camera hitherto produced at so moderate a price.



The following Specification of the principal points in its construction will, it is hoped, give all necessary information.

THE BODY is made of well-seasoned mahogany, grooved and tongued wherever necessary and covered with hard-surfaced leather

of good quality, all the exterior fittings are oxidised. Two Screw Bushes are fitted for attaching the Camera to a tripod.

THE LENS is a Series III. Stigmatic equivalent focus 5 in., working at an aperture of $f/7.5$ and giving with the full opening perfect definition to the extreme corners of the plate. It will be found equal to the best lenses of modern type as far as flatness of field and freedom from astigmatism is concerned, while it is of course absolutely rectilinear and free from flare spot.

FOCUSING is effected by a rack and pinion, the head of which projects very slightly; there is a clearly engraved scale accurately marked with distances from 5 feet to infinity.

THE SHUTTER is the Bausch and Lomb Unicum, and the lens can easily be detached from the camera.

THE CHANGING MECHANISM is of the simplest possible construction and it is practically impossible for it to fail, the plates are fitted into sheaths placed in the Camera in a vertical position, and are allowed to fall singly by a simple escapement movement into a well below, where they lie horizontally and whence they may be removed by means of a conveniently placed trapdoor, without in any way interfering with those remaining unexposed. The number of plates exposed is automatically indicated upon the top of the Camera. The changing mechanism will work equally well with one plate or a dozen.

THE FINDERS are of the Camera Obscura type and enable the image to be correctly centred upon the plate.

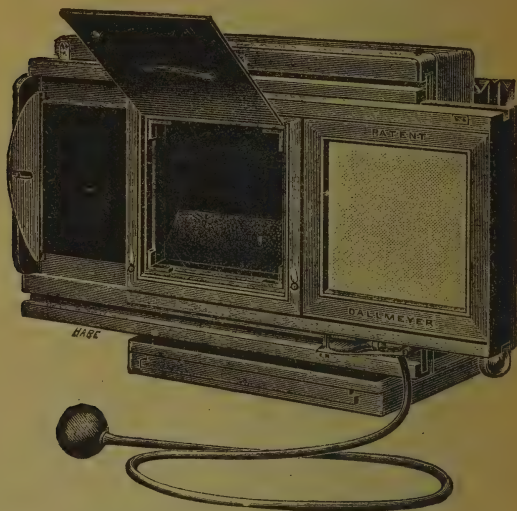
Price **£8 18s. 6d.**

*Or with Everset Metallic Shutter ... **£7 7s. 0d.**

* *N.B.—In this pattern the Lens cannot be used away from the camera.*

J. H. DALLMEYER, LTD., 25, NEWMAN STREET,
Oxford St., London, W.

Dallmeyer's New Cabinet Attachment for Studio Cameras.



(Showing slide in position for exposure and shutter half open.)

EVERY portrait photographer will realize the value of this highly practical apparatus, which permits of the plate being exposed within a fraction of a second after focussing, giving in fact a facility of operating which can only be equalled by a twin-lens or Reflex camera, and being at the same time free from the defects of either of these systems.

As will be seen from the above illustration, the dark slide is placed in a frame which has the focussing screen fixed at one end and an exposing shutter formed of two velvet covered flaps at the other, immediately in front of these flaps the dark slide is held by means of a spring bolt.

The manipulation is extremely simple, and is as follows:—

The dark slide is placed in position and focussing proceeded with in the ordinary way. When the desired position is observed, the whole of the frame is pushed as far as it will go to the right and the rubber ball pressed. These two simple actions displace the screen, open the dark slide, bring the plate into position and make the exposure, less than a second elapsing between focussing and exposure.

The apparatus is well made of the finest Spanish mahogany, and is guaranteed to stand the wear and tear of the busiest studio.

The pneumatic release of the shutter is of a simple form, and can be replaced in five minutes by anyone.

The dark slides are square in form, permitting of the plate being used either vertically or horizontally, and inner carriers for cartes are provided.

This apparatus has already been supplied to several well-known studios, and has given great satisfaction. It will save its cost in a week in a studio where many children are photographed.

It can be fitted to any.

Price, including two single slides, £5 5s.

J. H. DALLMEYER, LTD., 25, NEWMAN STREET,
Oxford St., London, W.

A BIT WORTH READING.

WE supply EVERYTHING likely to be required for use with
ACETYLENE GAS.

A FEW LINES.

"Moss Equal Pressure" Jet, 2-burner on tray 7/6

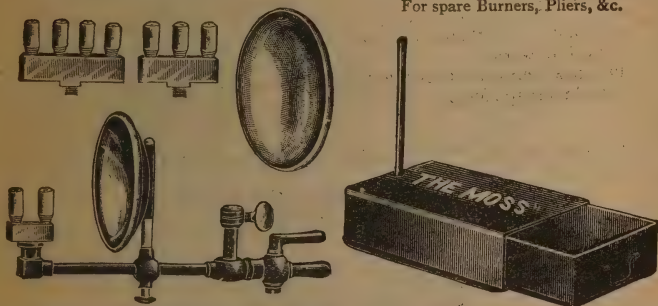
" " " " 3 " " " " " " " " 9/-

" " " " 4 " " " " " " " " 10/6

"Combination" Set,
With Tray, 12/6.

"Handy" Drawer Tray,
2/6.

For spare Burners, Pliers, &c.



Any Jet can be supplied with the "Handy" Drawer Tray for 1/6 extra.

The "MOSS" PATENT INDEPENDENT CONTROL JETS SIXTH SEASON, AND STILL RIGHT IN FRONT.

Two Burners, with Fine Adjustment Valves and Tray 10/6

" " " " Special Taps and Tray 8/6

Four " " " " Fine Adjustment Valves and Tray 15/-

" " " " Every Jet packed singly in stout box. 15/-

THE "MOSS" PURIFIER TRAY

IS A REAL BOON. Brighter Light. No Fumes. Burners Last Longer. 5/- each. "Acetylite," Carbide to water, generator is absolutely the best, most simple, and reliable apparatus for enlarging and lantern work. It can be turned on or off at will without waste or smell.

No 2.—All brass, $\frac{3}{4}$ lb. charge (for 1 or 2 burners) 25/-

" 4 " " " 1 lb. " (for 2 burners) 30/-

" 4a " " " handle, 1 lb. charge (for 2 burners) 32/6

" 3.—Galvd. Steel, enamelled, 1 lb. charge (for 2 burners) 22/6

" 5 " " " 2 lb. charge (for 4 burners) 45/-

STILL RUNNING. OUR 30/- OUTFIT.

No. 3 Acetylite Generator, 2-burner E.P. Jet, 4 feet I.R. Tubing, 2 extra Burners, 3 lb. Carbide. 30/- Lot.

Every reliable Generator kept in stock. A.A., Abingdon, Acetylite Crown, Dreadnought, Imperial, Incanto, &c.

Send stamp for New Illustrated Catalogue. It will pay you.

R. J. MOSS & SONS, 98, Snow Hill, Birmingham.

Established 1896.

Telegrams: "Acetylene, Birmingham."

VOIGTLÄNDER & SOHN, LONDON.

NEW.
NEW.
HELIAR LENS, F 4.5
**FOR ALL KINDS
OF WORK.**
**COLLINEAR LENSES ARE KNOWN ALL OVER
THE WORLD.**
Series II. F. 5.4.

" Nos. 5 to 9, F. 6.3.

 For quick, instantaneous, and
detective work.

 The back lens can be used alone
as a landscape lens.

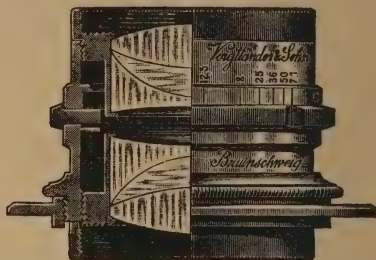
Series III. F. 6.8.

" Nos. 4 to 10, F. 7.7.

 For Hand Cameras and Stereo-
scopic Work.

 Series IV. wide angle anastigmat
for Architectural Process Work
and Landscapes.

The above can be fitted with Bausch and Lomb's Automatic Shutters.



TELEPHOTOGRAPHIC LENSES.

 SYMMETRICAL LENSES FOR HAND CAMERAS, &c.,
WITHOUT BRASS BODIES.

Apochromatic Collinears.

MANO HAND CAMERAS, fitted with Focal Plane Shutters, and
also with our Collinear Lenses for $\frac{1}{4}$ and $\frac{1}{2}$ pl. size.

 Ask for Illustrated Price Lists of Lenses and New Hand Cameras for
Roll Films or Plates. Results are splendid.

Illustrated Catalogues free on application.

STOCK KEPT BY ALL THE LEADING PHOTOGRAPHIC DEALERS.

OUR NEW HELIAR LENSES, F. 4.5, ARE EXCELLENT.

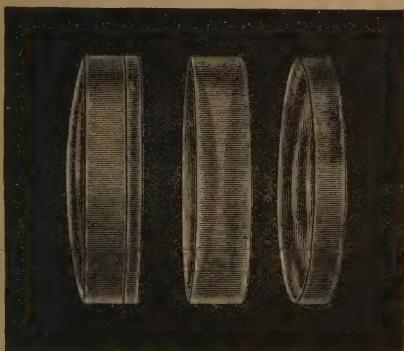
VOIGTLÄNDER & SOHN,

Established 1756.

Manufacturers of Photographic Lenses & Cameras,
92-96 BISHOPSGATE ST. WITHOUT, LONDON, E.C.

NEW.**NEW.**

Heliar Lens F 4.5 for Portrait Photography.

**SERIES 1a, F 2.3.**

Portrait Lenses for Astro. Photog.
Ciremat. Work,
Portrait Photography.

SERIES III., F 4.5.

Rapid Lenses for Single
Portraits and Small Groups.

SERIES VIIa, F 18.

Wide Angle Euryscope for
Landscape, Architectural and
Process Work.

SERIES I, F 3.16.

Chiefly for Portraits in the
Studio, on account of the
exceptional rapidity and
brilliancy.

SERIES IVa, F 7.

Universal Euryscope Lenses,
suitable for Groups in the
Studio, Architectural and
Landscape Work.

MAJOR LENSES, F 8,
For $\frac{1}{2}$ -Plate, **£3 5 0**

MINOR LENSES, F 8,
For $\frac{1}{4}$ -Plate, **£2 5 0**

**** Our New Heliar Lenses are Marvellous (F 4.5). ****

THE NEW "EVER READY" PORTABLE AUTOMATIC OXYGEN * GENERATOR, *

Pure Oxygen obtained in Five Minutes.

Patented in England and Foreign Countries.

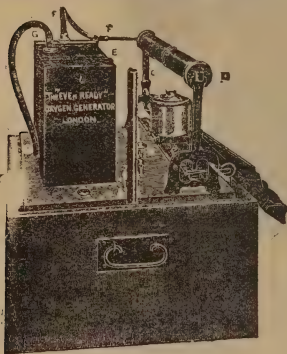
The Simplest and Most Perfect Apparatus in the market for producing Pure Oxygen in any desired quantity.

NO TROUBLE! NO WASTE OF TIME!

Works entirely Automatic, and gives sufficient Gas with one charged retort to supply an ordinary jet for over two hours.

Weight, exclusive of case, only 35½ lbs.

Packs into its own case. Measures 22 by 18 by 10 inches, and is ready for use in one minute.



PRICE, £6.



Erected ready for use.
Oxygen Cakes, 3/6 per dozen, each cake making 1½ cubic feet of gas.

Packed for travelling.
Oxygen Cakes, 3/6 per dozen, each cake making 1½ cubic feet of gas.

The "Ever Ready" is unsurpassed for brilliant results, and is invaluable to Lanternists, for Cinematograph work, or Photo Enlarging, or wherever Oxygen is required. Illustrated list and dealers' terms sent on application to

**THE
INTERNATIONAL OXY-GENERATOR SYND., LTD.,**
21, Southampton Row, Holborn, London, W.C.

Telegraphic Address: "PURGAMENT, LONDON." Telephone 2411 Gerrard.

THE SANDELL CRISTOID FILMS

REVOLUTION IN PHOTOGRAPHY.

SALES for 1902 were treble 1901 in spite of the unheard of opposition.

Advantages over other Films and Plates.

Great Lightness. No Halation. No Frilling, Blistering, nor Melting in the Hottest Climates. Quick Development, Fixing and Washing. No Curling in Development nor when Dry. Keep Indefinitely, as Best Plates. No Grain. Negatives of Crystal Brilliancy. May be Printed from Either Side. Perfectly Non-Inflammable. Over-Exposure is Practically Impossible.

PRICE LIST.

FLAT FILMS.

SENSITIVENESS:—300 H. & D.; 300 Watkin; 156 Wynne.

Inches.	Per doz.	Air-tight Damp-proof Cases. 2 doz. in each.	Centimetres.	Per doz.	Air-tight Damp-proof Cases. 2 doz. in each.
4½ × 3½	1/6	3/2	9 × 6½	1/2	2/6
5 × 4	2/3	4/8	9 × 12	1/10	3/10
6½ × 3½	2/4	4/10	10 × 13	2/3	4/8
6½ × 4½	3/-	6/2	12 × 16	3/4	6/10
6½ × 4½	3/4	6/10	13 × 18	4/-	8/3
7½ × 5	4/-	8/3	15 × 21	5/6	11/3
8 × 5	4/6	9/3	18 × 24	7/4	14/11
8½ × 6½	6/-	12/3	21 × 27	9/8	19/8
10 × 8	9/-	18/3	24 × 30	12/-	24/4
12 × 10	12/6	25/4	26 × 31	13/9	27/11
15 × 12	19/6	39/6	30 × 40	21/-	42/6

NOTE.—For extra European Export Flat Films are always packed in air-tight tins. 2 dozen in each tin, at a nominal increase of cost, as above.

Sandell Films & Plates, Ltd., Norwood Junc., LONDON, S.E.

Telegrams: "STEREOGRAM, LONDON." Telephone: No. 264 CROYDON.

[See following page.

CRISTOID DAYLIGHT CARTRIDGES.

For all the Standard Daylight Changing Cartridge Cameras and Daylight Roll Holders.

Kindly Read This.

N.B.—To obviate difficulty and prevent mistakes in ordering Cartridge roll films, it is necessary to explain that there are two kinds of spools in vogue, one for the Daylight Changing Roll Film Cameras, called the "Camera" spool, the other for the Daylight Changing Roll Holder, called the "Roll Holder" spool. (Roll Holder is the designation of the Film Slide attachment for the ordinary plate camera.) The winding and paper numbering of the two kinds of spools differ, therefore the Roll Holder spool is quite useless for the Camera and *vice versa*. In consequence **care must be taken** when ordering, to specify whether for Camera or Roll Holder. NAME OF CAMERA should be given when known. If this is not known give width of negative, i.e., length of **spool**, the figures first given in the column of Negative dimensions. To further simplify matters we have attached consecutive numbers to the spools, so that no difficulty can arise if the numbers are quoted with the letters C., or R.H. respectively. Specimen order thus:—"Please send 6 spools No. 7 C., or 4 spools No. 1 R.H.," which means oblong quarter plate films in each case.

NOTE.—Packed in tin cylinders for Export to Tropics, excepting two smaller sizes.

Sensitiveness—300 H. & D.; 300 Watkin; 156 Wynne.

CAMERA SPOOLS.

Size.					12 Exposures.	6 Exposures.
No.	1 C.	...	...	2½ in. × 2½ in.	—	6d.
"	2 "	...	...	2½ " × 3½ "	—	8d.
"	3 "	...	...	1½ " × 2 "	1/-	8d.
"	4 "	...	...	2½ " × 3½ "	1/4	9d.
"	5 "	...	...	2½ " × 4½ "	1/10	1/2
"	6 "	...	...	3½ " × 3½ "	1/10	1/2
"	7 "	...	...	3½ " × 4½ "	2/3	1/4
"	8 "	...	...	4½ " × 3½ "	2/3	1/4
"	9 "	...	...	4 " × 5 "	2/10	1/8
"	10 "	...	...	5 " × 5 "	2/10	1/8
"	11 "	...	...	7 " × 4 "	5/-	2/9

Above Sizes are suitable for the Alvista, Busch, Ensign, Lizars, Weno, and all other standard Daylight Changing Roll Film Cameras.

DAYLIGHT ROLL HOLDER SPOOLS.

No.	1 R.H.	...	...	3½ in. × 4½ in.	2/3	1/4
"	2 "	...	...	4½ " × 3½ "	2/3	1/4
"	3 "	...	...	4 " × 5 "	2/10	1/8
"	4 "	...	...	5 " × 4 "	2/10	1/8
"	5 "	...	...	6½ " × 4½ "	4/6	2/6
"	6 "	...	...	7 " × 5 "	5/-	2/9
"	7 "	...	...	12 cm. × 9 cm.	2/8	1/6
"	8 "	...	...	9 " × 12 "	2/8	1/6
"	9 "	...	...	13 " × 18 "	5/-	2/9

IMPORTANT.—There is NO DANGER from fire in using or storing these films as they are absolutely non-inflammable.

N.B.—These Films *keep indefinitely*. They may be exposed and developed at any time, provided they are kept free from damp.

We undertake DEVELOPMENT of Cristoid Films, charges in complete Price List on application.

Sandell Films & Plates, Ltd., Norwood Junction, LONDON, S.E.

Telegrams: "STEREOGRAM, LONDON."

Telephone: No. 264 CROYDON.

[See preceding and following page

SANDELL PLATE PRICE LIST.

All sizes not quoted are supplied at proportionate prices.	SIZES.		Sandell "Perfect" or Double.	Sandell Triple Plates.	Thickly Coated Single Film Plates Landscape. Ordinary. Special Express. Transparency.
	Inches.		Per doz.	Per 1/2-do.	Per doz.
	Centimetres.				
	3 1/2 x 3 1/2	... ..	£0 1 6	£0 1 3	£0 1 0
	4 1/2 x 3 1/2	... ..	0 2 6	0 2 0	0 1 7
	5 x 4	... ..	0 3 3	0 2 6	0 2 2
	6 1/2 x 3 1/2	... ..	0 3 8	0 3 0	0 2 3
	6 1/2 x 4 1/2	... ..	0 4 6	0 3 6	0 2 10
	6 1/2 x 4 1/2	... ..	0 5 3	0 4 0	0 3 5
	7 1/2 x 4 1/2	... ..	0 6 0	0 4 6	0 3 9
	8 x 5	... ..	0 6 6	0 5 6	0 4 3
	8 1/2 x 6 1/2	... ..	0 11 0	0 8 6	0 7 3
	10 x 8	... ..	0 16 0	0 12 0	0 10 6
	12 x 10	... ..	1 8 0	0 19 6	0 18 0
	15 x 12	... ..		
	9 x 12	... ..	0 1 10	0 1 9	0 1 3
	10 x 13	... ..	0 2 10	0 2 2	0 1 10
	12 x 16	... ..	0 3 8	0 3 0	0 2 3
	12 x 16 1/2	... ..	0 4 0	0 3 9	0 2 6
	13 x 18	... ..	0 5 8	0 4 10	0 3 9
	15 x 21	... ..	0 8 0	0 6 6	0 5 0
	18 x 24	... ..	0 11 8	0 9 0	0 7 9
	21 x 27	... ..	0 15 0	0 12 0	0 10 0
	24 x 30	... ..	1 12 6	1 2 6	1 0 0
	30 x 40	... ..		

	SENSITIVENESS.	H. & D.	WATKIN.	WYNNE.
Perfect, Triple, and Special Express	...	300	300	156
Ordinary	...	135	130	90
Landscape	...	23	16	14

THE SANDELL LANTERN PLATE.

(Thickly Coated.) 1s. per doz., on thinnest glass.

Specimen Slide sent free to dealers on application.

THE SANDELL . . PHOTO-MECHANICAL STRIPPING PLATE.

The Plate for Process Workers. Price as Single Film Plates.

Sandell Films & Plates, Ltd., Norwood Junc.,
LONDON, S.E.

Telegrams: "STEREOGRAM, LONDON."

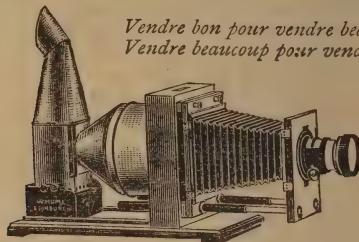
Telephone No. 264 CROYDON.

[See preceding page.]

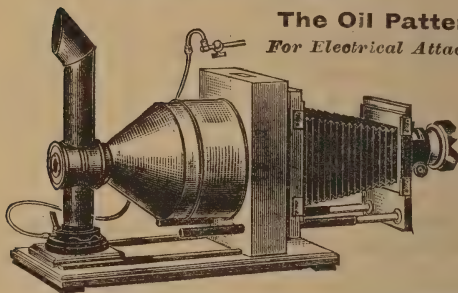
The CANTILEVER ENLARGING APPARATUS

Introduced in 1888, the advantages are Simplicity of Design, Good Lenses Accurately Centred, Equal Illumination, Rigidity with Free Movements, Rapidity and Comfort in use, Uniform Results.

OIL AND GAS LIGHT PATTERNS SAME PRICES.



*Vendre bon pour vendre beaucoup.
Vendre beaucoup pour vendre bon marché.*



The Oil Pattern, A Series.
For Electrical Attachment see below.

The Gas Pattern, A Series.

This Pattern can be fitted for the Incandescent Mantle or Acetylene Burner.

Condenser Diameter.	Plate Covered.	Stage Admits.	Without Objective.	Enlarging Objective.	Extra carrier any opening.	Packing Case.
5½ in.	4½ by 3½ in.	8½ by 6½ in.	5 5 0	1 15 0	3 0	2 0
6½ "	5 by 4 "	8½ by 6½ "	6 12 0	2 15 0	3 0	2 0
8½ "	6½ by 4½ "	10 by 8 "	9 5 0	3 5 0	4 0	3 0
9 "	7½ by 5 "	10 by 10 "	11 10 0	6 0 0	5 0	4 0

Fitting and adapting customers' Objectives, 7/6 to 15/-; Fine Triple Thread Screw Motion, 12/6. Sent carriage paid when cash in full accompanies order.

Electric Attachment in place of Gas or Oil Fittings, and including 100 Candle Focus Lamp, with neat special fittings easily detachable, Switch, Terminals, Diffuser.

**Price for 110 volts 30/-, for higher voltage 37/6,
EXTRA TO ABOVE PRICES.**

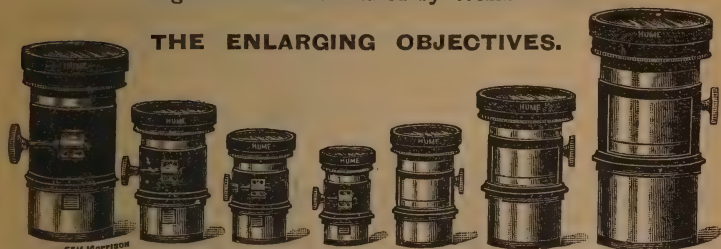
DESIGNED AND MANUFACTURED BY

WILLIAM HUME, 1, Lothian St., EDINBURGH.

THE CANTILEVER ENLARGING APPARATUS.

Designed and Manufactured by William Hume.

THE ENLARGING OBJECTIVES.



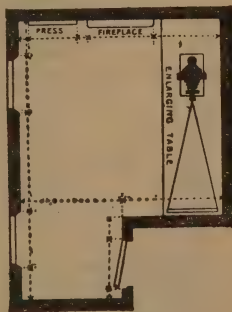
For Plates	...	$\frac{1}{4}$	...	$\frac{3}{8}$	...	$\frac{1}{2}$	...	$\frac{3}{4}$	...	$\frac{1}{1}$	...	$\frac{3}{8}$	...	$\frac{1}{8}$	Plates.
For Condensers	...	5 $\frac{1}{2}$	...	6 $\frac{1}{2}$	...	8 $\frac{1}{2}$	...	9	...	11	...	13	...	16	inches.
Prices	...	£1 15s.	...	£2 15s.	...	£3 5s.	...	£6.	...	£6 15s.	...	£12 10s.	...	£25	each.

Fine Quality, passing much light for short exposures. Good marginal definition, making Crisp Enlargements. In fine Oxydised Mounts, Rack and Pinion for fine focussing Yellow Glass Cap allows of Sensitive Surfaces being properly placed in a safe light.

The Curves of the Condensers and the Movements of the Cantilever Enlarging Apparatus are designed to work with above fine Series of Lenses. Customers having suitable Lenses can have them fitted.

They should be sent for proper adjustment.

Enlarging Objectives for Special Work for use with Daylight or Artificial Light for Extra Large Work or for Enlarging Maps, Engravings, Designs, and Letter Work. Large Heads, Full Length Portraits, &c.



Dark Rooms planned and fitted up for Developing, Enlarging, Reducing, with the neatest Benches, in the most compact and convenient manner.

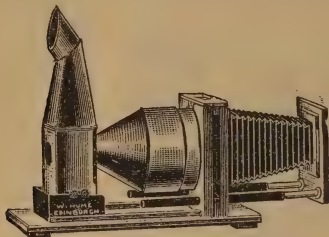
Send for Illustrated List to—

WILLIAM HUME, 1, Lothian St., Edinburgh

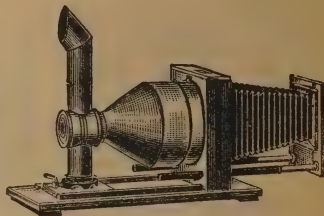
The CANTILEVER ENLARGING APPARATUS

The Improved B Patterns for Oil and Gas.

Prices of Gas Patterns reduced to Prices for Oil Models.



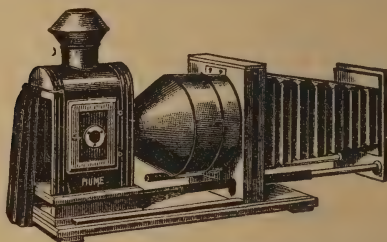
5 in. 4½ by 3, £3 5 0
6 in. 5 by 4, £4 6 0



8 in. 6½ by 4½, £6 9 0
9 in. 7½ by 5, £8 12 0

Packed and delivered carriage paid for cash.

8 in.,
£7 18 6



9 in.,
£10 4 0

Takes fittings for Lime, Electric, Mantle, or Acetylene Light.



4 in. size
for Oil.

The
4 in.,

£4

Case,

1s. 6d.



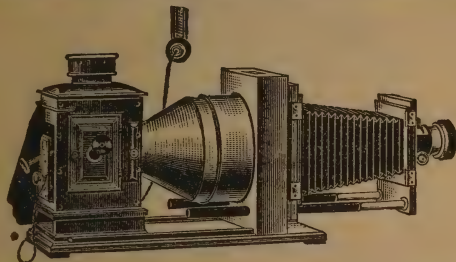
4 in. size
for Mantle or
Acetylene.

Send for Illustrated Catalogue and Working Instructions to
WILLIAM HUME, 1, Lothian St., EDINBURGH.

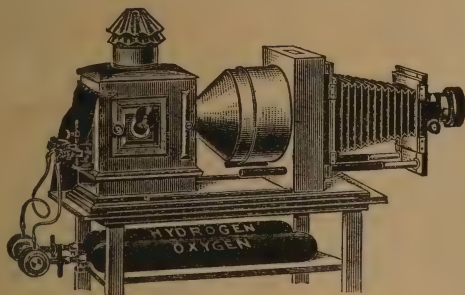
THE CANTILEVER ENLARGING APPARATUS.

The Best Electric and Best Lime Light Patterns.

"A" Series, specially suited for large and rapid Trade Work.



Both these Enlarging Lanterns are arranged to give a perfect imitation of diffused daylight, and are guaranteed to produce the finest class of enlargements independently of weather. Exposures about $\frac{1}{10}$ th those with oil light. No harsh effects. No parallax. No double lines. No rosey hairs. No accentuation of spots, scratches, &c. Facilitates the dispatch of work. For Bromide and Collodion Processes. Enlarged Negatives. Lantern Slides. Constant Actinic Value. Superior to Daylight. Inexpensive Plant. Exposures exceedingly short.



Above Patterns now same Prices.

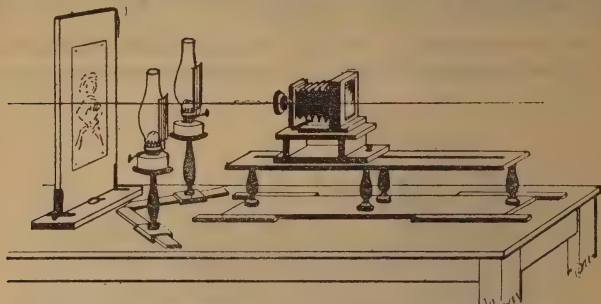
Condenser Diameter.	For Plates.	Price with Mahogany Lantern.			Price with Russian Iron Lantern.			Packing Extra.	
		£	s.	d.	£	s.	d.	s.	d.
8½ in.	6½ × 4¾	14	0	0	10	10	0	4	0
9 in.	7½ × 5	16	5	0	12	10	0	5	0
11 in.	8½ × 6½	21	10	0	17	5	0	6	0

Prices do not include Electrical or Lime-light Fittings nor the Enlarging Objective.

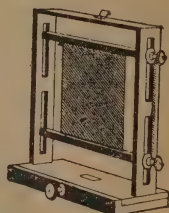
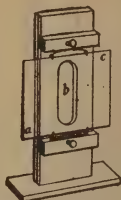
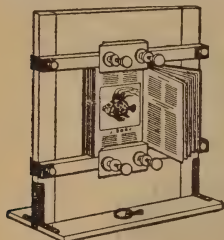
DESIGNED AND MANUFACTURED BY

WILLIAM HUME, 1, Lothian St., Edinburgh.

THE CANTILEVER ENLARGING APPARATUS.



Neat and correct arrangements for Copying, Reducing and Enlarging Positives by Reflected Light or for Reducing or Enlarging Pictures on Glass—Positive or Negative—by transmitted light. For use with daylight or oil, gas, electric or limelight. Maximum Light. Shortest Exposures.



Book-holder for copying illustrations. Price as shown £1 11s. Pair of Bars only with mountings £1 1s. Set of Brasses only 10s.

Simple Easel for making Enlarged Negatives. Holds plates from $6\frac{1}{2}$ by $4\frac{3}{4}$ to 20 by 16. Price 12s. 6d.

Best Negative Easel with Fine Focussing Screw for plates up to 15 by 12 £3 3s. 20 in. Drawing Board addition for positives 7s. 6d. For plates up to 20 by 16 £4 10s. 30-in. Drawing Board addition for positives 15s.



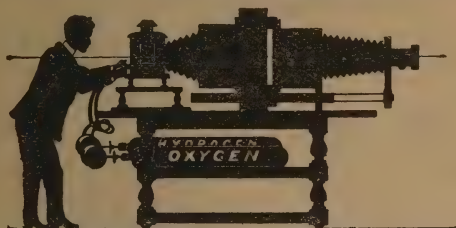
Incandescent Electric, Arc Electric, Incandescent Mantle, Acetylene and Oil Light Fittings.

ILLUSTRATED CATALOGUE AND WORKING INSTRUCTIONS.

WILLIAM HUME, 1, Lothian St., Edinburgh.

The Cantilever Enlarging Apparatus

for enlarging from Large Plates or reducing to
Lantern Slides or Process Blocks.



Enlarging from

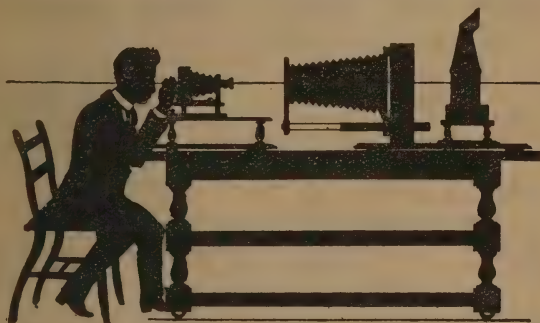
12 by 10 Plates with 16 inch Condenser.

10 by 8 „ „ 13 „ „

Amateur or Business Photographers requiring to enlarge from large negatives occasionally should inquire for **IMPROVED DAYLIGHT PATTERN AND SIMPLIFIED WINDOW FITTING**, stating what suitable Lenses they have.

Enlarging Objectives supplied for best results in any size or class of Enlargements.

If you require to make Enlargements quickly and turn them out with comfort, precision, and uniformity, without consulting the weather; then write for particulars of the **ELECTRIC ARC AND LIMELIGHT PATTERNS** for rapid commercial work,
per above Illustration.



THE CANTILEVER.

Making Lantern Slides or Process Reductions.

Perfect Equality of Illumination and Truth of Centering.

Mounting for customer's own camera, **15s. to 25s.** Worth it for comfort, precision rapidity; suited equally for private work or manufacturing quantities concentrated light, short exposures at short range, with oil, gas, acetylene lime, or electric light. Quicker, cheaper, and better than daylight. The very best method for reducing.

SEND FOR ILLUSTRATED LIST.

WILLIAM HUME, 1, Lothian St., EDINBURGH.

W. W. ROUCH & Co.

(ESTABLISHED 1854).

Photographic Chemists and Makers of High-class Apparatus.

PRIZE MEDALS AND AWARDS.

London, 1862 ; Dublin, 1865 ; Paris, 1867 ; Bristol, 1881 ;
London, 1885 ; Dundee, 1886 ; Crystal Palace, 1888.

ROUCH'S PATENT PORTABLE CAMERA,

Unquestionably the **LIGHTEST** and **MOST PORTABLE** Landscape Camera of first-class workmanship in the Market. *Par excellence* the Camera for general outdoor work. It is provided with every possible motion desirable in a high-class camera, is of the best material and highest class of workmanship, and has been used by hundreds of the best Photographers since its introduction.

PRICES, complete with Three Double Backs, Reversing Frame, Swing Back, &c.

Size.	Price.	Size.	Price.
1. $6\frac{1}{2} \times 4\frac{1}{4}$	£7 12 6	4. 10×8	£10 2 6
2. $7\frac{1}{2} \times 5$	8 0 0	5. 12×10	12 3 6
3. $8\frac{1}{2} \times 6\frac{1}{2}$	8 12 6	6. 15×12	15 10 0

Brass Binding for the Tropics, 1, 2, and 3, £1 15s.; 4, 5, and 6, £2 5s.

ROUCH'S NEW PATENT LONG AND SHORT FOCUS CAMERA.

COMPLETE SETS OF APPARATUS.

Comprising **Rouch's Patent Portable Camera** with Three Double Backs, **Rouch's Instantaneous Doublet Lens** for Landscape, Architecture or Groups, and **Instantaneous Shutter**, the whole in Solid Leather Case with Spring Lock; also Sliding Adjustable Tripod Stand, Focussing Eye Piece, Argus View Finder, Focussing Cloth, **Portable Chemical Laboratory**, Dark Room Lantern, Dry Plates, and all necessary Chemicals and Appliances for Developing and Storing the Negatives, and Printing and Mounting the proofs.

PRICES OF ABOVE, SET FOR PICTURES:—

$6\frac{1}{2} \times 4\frac{1}{4}$	£16 10 0	$8\frac{1}{2} \times 6\frac{1}{2}$	£21 10 0
$7\frac{1}{2} \times 5$	17 10 0	10×8	28 0 0
12×10 ... ..	...	...	£34 0 0

Send for ROUCH'S COMPLETE CATALOGUE.

Profusely illustrated. Now ready. Post free, price 6d.

Purest Chemicals and Preparations. High-class Apparatus of every description.

W. W. ROUCH & CO., Contractors to His Majesty's Government,

Next Door to King's College, **161, STRAND, LONDON, W.C.**

[See following page and pages 2 and 3.]

ROUCH'S STEREOSCOPIC HAND CAMERA.

For Twelve Stereoscopic Negatives or Twenty-four Lantern Size.

Sizes, $6\frac{1}{2} \times 3\frac{1}{2}$, or $6\frac{1}{2} \times 4\frac{1}{2}$.



To meet the growing requirements for a Hand Camera by means of which pictures may be made for the Stereoscope, W. W. Rouch & Co. have introduced the present instrument, which is a modification of the celebrated "EUREKA" Camera. It is fitted with a pair of accurately adjusted Lenses and Thornton-Pickard Adjustable Shutter, with Speed Indicator. The plates

are carried in Rouch's Patent "Eureka" Changing Back, with automatic register. Price complete, with one pair of Lenses, fitted with Iris Diaphragms, Finder, &c.,

£12 12s.

ROUCH'S "EXCELSIOR."

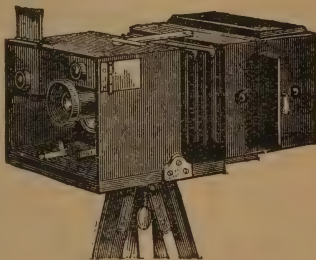
As a Hand Camera it possesses all the valuable features of the "EUREKA." It is specially constructed for use with the "EUREKA" DETACHABLE CHANGING BACK, though it can be equally well employed with ordinary double slides, or with a roll-holder. By removing the plate reservoir the "EXCELSIOR" is converted into an ordinary Camera.

Prices of the "Excelsior Hand Camera," with two Lenses (Instantaneous doublet and wide angle), Double Rising Front, Rack and Pinion Focussing Adjustment, pair of brilliant View Finders, Thornton-Pickard Adjustable Shutter, with Speed Indicator, Detachable Changing Back, focussing Glass Frame, and Automatic Register, complete for plates:—

$4\frac{1}{2} \times 3\frac{1}{2}$ £12 12s.

5×4 £14 14s.

Half-Plate £17 17s.



"Excelsior" Camera shown on Tripod Stand for Gap Exposures.

ROUCH'S celebrated A.B.C. DEVELOPING SOLUTIONS.

ROUCH'S "METOQUINONE" DEVELOPING SOLUTION
(CONCENTRATED) FOR PLATES, FILMS AND BROMIDE PAPER.

ROUCH'S "UNIVERSAL" COLLODION FOR PROCESS WORK.

W. W. ROUCH & CO.,

161, STRAND, LONDON, W.C.

[See preceding page and pages 2 and 3.]

POLYTECHNIC School of Photography,

307, 309, 311, REGENT STREET, LONDON, W.

QUINTIN HOGG, Esq., *President.*

Under the direction of Mr. HOWARD FARMER,
and staff of specialists.

THE FIRST, LARGEST, AND MOST SUCCESSFUL
SCHOOL OF PHOTOGRAPHY IN THE WORLD.

Over **one thousand** Professional Photographers have
studied at the School during the past four years.

**A COMPLETE COURSE OF
PRIVATE
INSTRUCTION IN
PHOTOGRAPHY.
FIVE GUINEAS.**

**SPECIAL COURSES OF
PROFESSIONAL
TRAINING IN
PURE PHOTOGRAPHY
OR
PHOTO-ENGRAVING.**

*The latest appliances, methods, and formulæ employed
by the trade are used, the teachers being in most cases
(and wherever possible) well-known men professionally
engaged in the special subject they teach.*

N.B.—When making inquiries by letter please state
requirements fully and address

ROBERT MITCHELL, *Secretary.*

Lessons
in
Portraiture.

Architectural
and
Landscape
Photography.

In Photo-
gravure.

Colour
Photography.

Process
Engraving.

Photo-Litho.

Collotype.

Wet
Collodion.

Silver
Printing.

Carbon
Printing.

Platinum
Printing.

Bromide
Printing.

Enlarging.

Retouching.

Finishing
Enlargements in

Black and
White,

in Water
Colours,

and in Oils.

Tinting.

Miniature
Painting.

A Complete Course of Private Instruction in Photography. FIVE GUINEAS.

PHOTO-ENGRAVING DEPARTMENT.

LINE and SCREEN NEGATIVE MAKING:—

- (a) With Wet Collodion.
- (b) With Slow or Instantaneous Dry Plates.

TRICOLOUR NEGATIVES, Direct Screen with Dry Plates or Collodion Emulsion.

LINE and HALF TONE BLOCKS in Zinc and Copper.

PHOTOGRAVURE.

FINISHING and DRAWING for Press Reproductions:—

- (a) Line Drawings for Newspaper or Magazine Work.
- (b) Half-tone and Wash Drawings.
- (c) Working up Photographs and Drawings.
- (d) Colouring " " " for tricolour reproductions.

* * * *

HAND WORK or FINISHING DEPARTMENT.

RETOUCHING.

FINISHING ENLARGEMENTS—Bromides and Platinotypes:—

- (a) In Powder, Crayon, and Chalk. | (b) In moist Colours (monochrome).
- (c) With the Aerograph.

FINISHING ENLARGEMENTS—Carbons:—

- (a) In Moist Colours (monochrome). | (b) With the Aerograph.

FINISHING ENLARGEMENTS IN COLOURS:—

- (a) Tinting and Colouring in Water Colour or Oils.
- (b) Pastel Painting.

FINISHING SMALL PLATINOTYPES or BROMIDES:—

- (a) Putting in Vignetted or Fancy Backgrounds with Moist or Dry Colour or with Aerograph.
- (b) Tinting or Colouring with Moist or Dry Colours.

MINIATURE PAINTING in WATER COLOURS or OILS:—

- (a) On Platinums or Bromides. | (c) On Carbon or Opal or Ivory.
- (b) On Albumen or P.O.P. Prints. | (d) Direct from Life or Photos.
- (e) Lantern Slides.

* * * *

TESTING DEPARTMENT.

LENSES and all APPLIANCES for the various classes of work TESTED in presence of STUDENT or CLIENT.

N.B.—When making inquiries by letter, please state requirements fully and address
ROBERT MITCHELL, Secretary.

MAWSON'S DRY PLATES

Are
Always
Uniformly
Excellent in
Quality and
Speed.

BRANDS—

“Castle” Ordinary.

“Electric” Extra Rapid.

“Mawson” Instantaneous.

“Lantern” Transparencies.

“Half Tone.”

“Photo Mech.”

“Ortho.”

MAWSON & SWAN, Newcastle-on-Tyne, England

For MAWSON & SWAN'S Adverts., see pp. 1438 to 1461.

